THE

AMERICAN REVIEW OF TUBERCULOSIS

ABSTRACTS OF TUBERCULOSIS

VOLUME XL OCTOBER, 1939 ABST. No. 3

CONTENTS

PAGES

Treatment
a. *Medical (concluded)* 41–43
b. *Pneumothorax and pneumoperitoneum* 43–48
c. *Surgical* 48–63
Tuberculosis in Animals 63–64
Diseases Other than Tuberculosis
a. *Nontuberculous infections of lungs* 64–64

Oils in Treatment of Pulmonary Tuberculosis.—"Mutton-bird" and Dugong oil have been used both in New Zealand and the Commonwealth of Australia for many years, and at Westwood Sanatorium, Queensland, Blackburn has used mutton-bird oil, either pure or in emulsion, for many years. The emulsion, "Ariol," is prepared with acacia and tragacanth gums and sweetened with saccharine. It has a high iodine and saponification value with only a small proportion of free fatty acids. Mutton-birds are a species of petrel or puffin, nesting in tunnels and travelling in large flocks. The oil is squeezed from the crops while warm, about one ounce per bird. Dugong oil is derived from a kind of sea cow, order Sirenia, genus Halicore, to which also belong the manatees. Sea-cows are herbivorous mammals inhabiting shallow bays and creeks in the Red Sea, East African Coast, Ceylon, Bay of Bengal, and abundant on the Queensland coast. They are six to twenty feet long and browse mainly on seagrass. Dugong flesh is like pork and the oil produced about one gallon per hundred pounds body weight. Dugong oil is now being tried out at Woorabinda Aboriginal Settlement and elsewhere. Codliver oil consists of olein about 70 per cent, palmitin 25 per cent, vitamins A and D, and aselline, morrhuine and butylamine (alkaloids). Blackburn personally records gratifying clinical results from the use of mutton-bird oil, observed in over 100 patients.—*Oils Used in the Treatment of Pulmonary Tuberculosis, with Special Reference to "Mutton-Bird" Oil and Dugong Oil Used in New Zealand, J. H. Blackburn, Brit. J. Tuberc., October, 1937, xxxi, 285.*—*(A. P.)*

Treatment of Unilateral Pulmonary Tuberculosis.—The recognized importance of bed-rest therapy and collapse therapy in treating pulmonary tuberculosis was an incentive to investigate their relative value in unilateral cases admitted for sanatorium treatment at Laren, Holland, over a five-year period, 1931–1936. The total number of cases admitted over this period was 1,260, of whom 12.6 per cent had recent pleurisy with effusion, 52.1 per cent more or less advanced bilateral tuberculosis, and 22.1 per cent, or 279 cases, unilateral tuberculosis; of these last only 116, or 59.5 per cent, showed a positive sputum. The first and last groups are of special interest. It is generally known that frequently pleurisy with effusion marks the beginning of pulmonary tuberculosis but it is less well known that many cases of extrapulmonary tuberculosis (bones and joints) show a previous pleuritic history (13.3 per cent of 150 cases). Although fresh air, good food and plenty of rest are accepted as the triad of fundamental therapy, there are discrepancies in routine practice. Guidance has been given by the temperature (probably least important), pulse, sputum, X-ray findings, and such laboratory data as sedimentation time, Schilling's differential

leucocyte count, and finally the weight curve. The patient should be kept in bed until all findings are normal, with sputum negative for three months. One may allow one month to "mobilize," three months for graduated exercise, three months more for the workshop, and perhaps one to two years for complete recovery. The X-ray will show visible reduction of inflammation, cavitation and perifocal reaction, the same will be indicated by the blood sedimentation time, while the Schilling count, a very delicate test, is perhaps more responsive to changes in tuberculin sensitiveness, perhaps influenced by sympathetic and parasympathetic nervous factors. Bed-rest remains the rock on which treatment for tuberculosis is built and may be regarded as corresponding to additional local immobilization, as in bone and joint conditions. However, it is now recognized by orthopaedists that ambulatory treatment of fixed tuberculous joints is inadmissible and so is collapse therapy without bed-rest in pulmonary tuberculosis so long as active disease is present, although circumstances may force a compromise. The possibility of spontaneous healing of small cavities is recognized and even admitted that exceptionally larger cavities of short duration may so heal. Most, however, do not. Cavities may be present without signs and collapse therapy is the treatment of choice. Without proper general treatment, however, it is an abomination. Nor should too much hope be held out of its shortening the time of treatment. Of 166 unilateral cases, with sputum positive on admission, 124, or approximately 75 per cent, lost their bacilli, or were rendered negative, on discharge, the proportions being the same in cases treated with and without collapse therapy. However, to accomplish the same results, 60 per cent required additional collapse therapy, 40 per cent did not. Collapse therapy consisted of 24 cases given pneumothorax, 59 cases given phrenic evulsion and 16 cases given both. Only 2 cases were given thoracoplasty in this group and these remained sputum-positive. Analyzing 361 positive sputum cases, regardless of involvement, between 1934–1936, and regardless of duration of treatment, approximately 50 per cent of 209 treated without collapse were made sputum-negative, and 62 per cent of 152 treated with collapse. Of all cases rendered sputum-negative, 58 per cent had received no collapse therapy and 42 per cent did receive it. Selecting 166 cases and comparing those with definite cavitation and those without as to results, in 73 of this number, it appears that expectant treatment alone yields satisfactory results in most in the absence of cavitation, but when this is present, especially if on the left side, collapse therapy will be required in the large majority (83 per cent).—*Reflections on the Treatment of Unilateral Pulmonary Tuberculosis, P. J. L. DeBloeme, Tubercle, December, 1937, xix, 120.*—(*A. P.*)

Gold Treatment of Pulmonary Tuberculosis.—One hundred and fifty patients of the Sanatorio La Esperanza were treated with gold during their hospitalization. Clinical and radiological cure was obtained in 17 per cent and clinical cure with radiological improvement in 34 per cent. Of the remaining cases 13 per cent were unimproved and 34 per cent became worse or died. Conclusions to be drawn from these observations are that gold therapy should be applied in bilateral pulmonary lesions where the exudative character is not predominant and in cases with fine bronchogenic or haematogenous nodes of recent origin, provided that there is no extrapulmonary lesion. An exception is made in cases of laryngeal tuberculosis and in those with small well delineated cavities where the remaining parenchyma is not involved. Gold therapy has not been successful in confluent haematogenous lesions with extrapulmonary involvement, in bronchopneumonic infiltrations, in large pneumonic lesions with cavities, and in cases of large thick-walled cavities. Sometimes serious complications occurred which were attributed to the gold medication, and in 45 cases the treatment had to be discontinued on account of intolerance. Over 50 per cent of the latter suffered from digestive symptoms, while in the remaining cases intolerance was shown by symptoms from skin, kidneys, nervous and circulatory systems. Intolerance cannot be overcome by variation of the dosage; the latter, however, presents a difficult problem even in patients with good or fair tolerance. The optimal total dosage was found to be between 8 and 9 g.; it was given by intravenous injections of 0.05 to 0.50 g. over several weeks with intervals of three to fourteen days between each injection. With higher doses the interval was increased in order to avoid accumulative effects. Lately the method of giving 0.10 and 0.05 g. on alternate days has been used and this seemed to bring faster results because it counteracts aurosensibility and improves the susceptibility of the patient. Although malignant toxic effects have not occurred, nevertheless, the treatment is hampered by the unpredictable and uncontrollable occurrence of intolerance. During the time of treatment regular daily clinical and laboratory examination should carefully be carried out.—*Tratamiento de la tuberculosis pulmonar por los sales de oro,*

F. Menendez, Rev. de tuberc. d. Cuba, April 2, 1938, I, 218.—(F. G. K.)

Sulfanilamide in Experimental Tuberculosis.—Intramuscular treatment with sulfanilamide, begun two hours after inoculation, was without demonstrable beneficial effect on the course of experimental tuberculosis in guinea pigs. Treatment begun nine days after inoculation with the sodium salts of six derivatives of sulfanilamide also was without demonstrable curative effects.—*Sulfanilamide and Derivatives in the Treatment of Experimental Tuberculosis of Guinea Pigs, J. A. Kolmer, G. W. Raiziss & Anna M. Rule, Proc. Soc. Exper. Biol. & Med., December, 1938, xxxix, 581.—(F. B. S.)*

Sulfanilamide in Experimental Tuberculosis.—Sulfanilamide had an inhibitory effect upon the development of tuberculosis in the guinea pig if administered before infection, but if given seventeen to twenty-four days after infection the macroscopical appearance of the tuberculous process was not altered. The daily administration of 300 mg. of the sulfanilamide was found to be definitely toxic for the infected guinea pig. The development of sensitivity to tuberculin was unaltered by sulfanilamide therapy.—*Effect of Sulfanilamide on Experimental Tuberculosis in the Guinea Pig, P. H. Greey, H. H. Campbell & A. W. Culley, Proc. Soc. Exper. Biol. & Med., October, 1938, xxxix, 22.—(F. B. S.)*

Prontylin Treatment.—Guinea pigs inoculated intracerebrally with tubercle bacilli, and then treated intraäbdominally with a total of 6.35 g. of prontylin during thirty days following inoculation, showed no significant increase in survival time over untreated control tuberculous guinea pigs.—*Inefficacy of Prontylin in Experimental Tuberculosis, K. C. Smithburn, Proc. Soc. Exper. Biol. & Med., May, 1938, xxxviii, 574.—(F. B. S.)*

Chemotherapy.—Sensitized rabbits were infected with mildly virulent human and bovine tubercle bacilli in order to reproduce the chronic fibrotic type of pulmonary tuberculosis seen in humans. Two or three months following infection these animals received chemotherapy by inhalation and injection, and after a variable period of treatment the surviving animals were autopsied. The influence of chemotherapy on the course of the disease in the experimental animals was compared with the untreated, similarly infected control animals. The gold preparations, T 226 or taurocholic acid and solganal B. oleosum, and the bismuth preparation, T 228, were found to have a favorable influence, while silver-oxybenzylidin was only moderately favorable. No results were obtained from the iron preparation, T 268, or from the silica compounds used. Experiments with sanocrysin and lopion were not completed and will be reported in a later communication.—*Versuche einer chemotherapeutischen Beeinflussung der experimentellen Lugentuberkulose, K. W. Jötten & H. Reploh, Ztschr. f. Tuberk., September, 1938, lxxx, 345.—(A. B. C.)*

Progesterone in Experimental Tuberculosis.—Male guinea pigs were treated subcutaneously with daily doses of 0.5 unit of progesterone three times daily for six weeks following subcutaneous inoculation with bovine tubercle bacilli. The extent and variation in type of macroscopical lesions at autopsy were found to be the same for the treated and untreated animals. Microscopical pathology was also similar in the two groups. The skin sensitivity to tuberculin also was not altered by the treatment.—*Influence of Progesterone on Experimental Tuberculosis in Male Guinea Pigs, M. R. Greene & H. R. Morgan, Proc. Soc. Exper. Biol. & Med., June, 1938, xxxviii, 656.—(F. B. S.)*

Effect of Posture on Intrapleural Pressure.—The intrapleural pressure following refills was determined in 14 pneumothorax patients in various postures. The conventional lateral position constantly gave the highest negative pressure, the supine position the lowest negative pressures. Intermediate pressures were noted in the upright position and in the posture midway between the lateral and supine. The author points out that although refills given in the conventional posture are usually terminated with negative pressures, patients who return to bed or who are ambulatory will have an increased intrapleural pressure which may be greater than atmospheric. Accordingly refills are no longer given in the lateral position. Patients who are at bed-rest for the greater part of the day are given treatments in the supine position, while patients who are for the most part ambulatory are placed for refills in the position midway between the lateral and supine.—*Sur les dépressions pleurales au cours du pneumothorax artificiel et leurs variations avec les changemenis de position du sujet, C. Spezzafumo, Rev. de la tuberc., December, 1937, iii, 1152.—(H. L. I.)*

Measurement of Intrapleural Pressure.—Kuss and many other phthisiologists have compared the intrapleural pressure to a so-called "average mean" pressure. This

they affirm gives the exact measurement of the "permanent pressure" which exists in the pneumothorax space. This pressure takes into consideration the variations of intrapleural pressure, both inspiratory and expiratory. A problem then arises, how to measure in an exact way the values of inspiratory and expiratory pressures. The authors studied the principal factors that interfere with the exact measurement of these pressures in a given position and at a given time. They employed two types of manometers in their experiments, a metallic and a water manometer. It was found that the inertia of the mass of displaced fluid in a water manometer modifies the pressure reading. This factor can be eliminated by using a metallic manometer. However, except for the factor of the inertia of the fluid and the time factor, the advantages of the anaeroid type of metallic manometer over the water manometer are practically negligible. In all the controlled experiments related to pressure readings, using both types of manometers, the inspiratory and expiratory pressures were similar; a significant difference is found only in the very dyspnoeic patient where the metallic manometer is superior. It is advisable in all cases of therapeutic pneumothorax to use a needle of small calibre at the time of the refill. This tends to prevent an overestimation of the variations in pressure when using a U-tube water manometer. When a very large or single tube water manometer is employed there is a tendency to underestimate the pressures, chiefly the inspiratory pressure because of the longer duration of expiration. The authors conclude that for practical purposes the water manometer is not inferior to the metallic manometer, only in tachypnoea is the latter superior.—*De la mesure des pressions du pneumothorax artificiel, A. Bernou & F. Toury, Arch. méd. chir. de l'app. respir., 1938, xiii, no. 1, 44.*—(*J. E. F.*)

Pleural Adhesions and Artificial Pneumothorax.—The radiological evidence of pleural adhesions of 308 lungs is discussed with respect to induction of pneumothorax. In the case of 34 lungs with a previous pleurisy and of 7 lungs with a previous pneumothorax it was usually impossible to use pneumothorax, but in a few cases good results were obtained. A good pneumothorax was never obtained and was usually not obtained at all in 31 cases of obliterated costophrenic sinus, with or without previously acknowledged pleurisy, and in 16 cases where the lungs had a distinct pleural rind. Pneumothorax was usually possible and generally followed with good results in 80 patients who had one to three single pleural spikes at the apex corresponding to adhesions which were generally fit for cauterization. The results were not so good in a group of 107 patients having no distinct signs of pleural involvement but with diseased parts of the lungs extending to the chest wall. The best results were obtained in 50 patients having neither signs of pleural involvement nor diseased parts of the lung extending to the chest wall.—*On the Radiological Evidence of Pleural Adhesions with a View to Attempts at Artificial Pneumothorax, H. Myhre, Acta tuberc. Scandinav., 1938, xii, 76.*—(*F. B. S.*)

Pathogenesis of Effusion Complicating Pneumothorax.—Study of 200 random patients with pneumothorax (bilateral in 17 instances) showed 88 per cent had adhesions. Effusions (transient small collections not included) occurred in 48 per cent of the patients having adhesions, and in 11.5 per cent of those with a free space. In accordance with the findings of other investigators, half of the effusions were noted during the first three months of pneumothorax and 70 per cent during the first six months. Thoracoscopy of 100 patients showed that the hyperaemia and localized pleuritis which precede effusion most often occurred in the neighborhood of the adhesions. The author is of the opinion that adhesions exert a mechanically traumatizing effect on the pleura which accounts for many effusions. Severance of adhesions in the early weeks of pneumothorax is advised for the prophylaxis of effusion. Complications following early pneumonolysis have been few.—*Aspects thoracoscopiques (contribution a l'étude de la pathogénèse des pleurésies du pneumothorax), D. Michetti, Rev. de la tuberc., March, 1938, iv, 298.*—(*H. L. I.*)

Cavity Distention in Pneumothorax.—In some cases of tuberculous cavities in the upper lobes of the lungs, the cavities have been observed to grow larger in the course of artificial pneumothorax treatment. There are three factors which control the distensibility of a fibrous walled pulmonary cavity: (*1*) the capacity of the cavity to distend which depends upon the thickness and rigidity of its wall; (*2*) the air pressure within the cavity, this pressure is equal to one atmosphere if the draining bronchus is open and rises to varying levels if the bronchi are obstructed and act in a valve-like manner; (*3*) the resistance of the surrounding thoracic contents. Thus in the presence of atelectasis of the neighboring pulmonary tissue a pulling force is exerted upon the cavity wall. If the walls of such cavities are in immediate contact with the pneumothorax space, a distending force is exerted

upon the wall of the cavity whenever the pressure within the pneumothorax space is less than one atmosphere which is the lowest pressure that can obtain within a pulmonary cavity. In such cases positive pneumothorax pressures should be early resorted to. When subjected to positive pneumothorax pressures the suspended cavity will not only be prevented from distending but it may become deflated and collapsed. Five cases with roentgenograms are reported.—*Distention of the Pulmonary Tuberculous Cavities in the Course of Artificial Pneumothorax Treatment, P. Slavin, Quart. Bull. Sea View Hosp., January, 1938, iii, 167.*—(*A. A. E.*)

Bilateral Pneumothorax.—Rapid intervention, in the form of collapse therapy, is indicated in the presence of cavernous pulmonary tuberculosis. This practice should also be followed when the disease is bilateral. Bilateral pneumothorax is a very valuable procedure when good collapse can be obtained. In every case where there are adhesions which are wholly or partly accessible to cauterization, they should be cut, independent of whether the sputum is positive or whether there are clinical signs of activity. Small or stationary exudates do not constitute a contraindication to the Jacobaeus procedure. It is also important to perform cauterization within four to six weeks after induction of the pneumothorax. Delay may make later attempts at cauterization difficult, owing to the adhesions having become firmer, or on account of the occurrence of an exudate. In patients with adhesion free pneumothorax, Törning obtained healing in 29 out of 32 cases; where adhesions impossible to cauterize were left, healing was obtained in only 47 out of 62 cases. In bilateral cases, pneumothorax is first induced on the more involved side. If adhesions are present, these are then cut and treatment, in the same manner, is then instituted on the contralateral side. All adhesions should be cut as far as possible, even if this necessitates several attempts. In one case thoracoscopy, six weeks after induction of pneumothorax, revealed adhesions which could not be cut. Further thoracoscopy, seven months later, showed that cauterization was now possible; the adhesions were cut and the ultimate result for the patient was good. In 10 cases of bilateral, cavernous, pulmonary tuberculosis, bilateral pneumothorax was used in the manner described above. In 5 cases cauterization of adhesions was carried out on one side; in the other 5, bilateral cauterization was necessary. In 2 cases, it was necessary to carry out repeated cauterizations on one side. Where the lung could not be entirely freed, the operation resulted in such an improved collapse that healing of the lesion resulted. In all 10 cases bacilli did not disappear from the sputum until a good collapse was obtained. During the treatment, the vital capacity of the patients varied between a minimum of 1,100 cc. and a maximum of 3,000 cc. The time during which both lungs were being treated at the same time varied between six months and four years, and the total treatment periods between three and one-fourth and seven years. After discontinuation of the pneumothorax, the lung always shows some residual scarring. The healing of the original lesions in these 10 cases was very satisfactory. These patients have been followed up to a period of five years, and they are all perfectly well. This series was chosen to show some of the good results of this treatment, and not as representing all the cases treated in this manner.—*Some Healed Cases of Cavernous Pulmonary Tuberculosis Treated by Bilateral Pneumothorax, I. Stahle, Acta med. Scandinav., October, 1938, xcvii, 132.*—(*H. R. N.*)

Unexpected Cavity Closure.—A group of 12 cases in which there was closure of cavities following the discontinuance of an ineffectual pneumothorax is presented. In 7 of the 12, phrenic nerve interruptions were done at the time pneumothorax was abandoned and in one it was done three months prior to discontinuation. No satisfactory conclusion was reached as to the mechanism involved and no characteristics common to the cases were noted. When not contraindicated, a temporary phrenic nerve interruption should be done at the time pneumothorax is abandoned and the benefit of its action determined before thoracoplasty is performed. It is suggested that closure of cavity occurs frequently enough to warrant a period of delay during which there may be some indication as to whether final closure will occur without surgical intervention.—*Unexpected Cavity Closure following Reëxpansion of the Lung after an Ineffectual Pneumothorax, J. D. Steele, J. W. Trenis & E. W. Laboe, J. Thoracic Surg., June, 1938, vii, 498.*—(*L. F. B.*)

Atelectasis.—Resorption atelectasis due to intrinsic or extrinsic bronchial obstruction is not uncommon in the course of pulmonary tuberculosis and artificial pneumothorax. Three cases are reported, in which, following a refill, atelectasis produced marked respiratory embarrassment, and in one case led to a fatal termination. With careful management of pneumothorax refills and frequent X-ray examinations the dangers of atelectasis complicating artificial pneumo-

thorax can be avoided.—*Resorptionsatelektase und Pneumothorax, L. Hantschmann, Ztschr. f. Tuberk., September, 1938, lxxx, 350.*—(*A. B. C.*)

Closed Pneumonolysis.—The recognized indications for operation are the presence of adhesions preventing closure of a cavity or heavily infiltrated area, severe symptoms that are a result of pressure in the pneumothorax cavity, and large, well organized adhesions which contract and threaten the loss of the pneumothorax. On 230 patients, 251 operations were performed. There were 19 explorations without operation. Cavities closed by operation, 74.8 per cent; sputum changed from positive to negative, 93.5 per cent; and satisfactory collapse was obtained in 86.4 per cent of cases. The only apparent valid contraindication for operation is the presence of an acute serous or purulent fluid. Other than effusions, the following complications occurred: one severe haemorrhage, two moderate haemorrhages, one extensive subcutaneous emphysema, two pulmonary haemorrhages and no pyogenic or mixed empyema. A tuberculous empyema developed in 6 (2.6 per cent) cases. The presence of fluid was demonstrable in 64 (27.6 per cent) cases before operation and in 78 (33.6 per cent) cases after operation. There was no mortality. It may be noted that in 270 thoracoscopic examinations, multiple pleural tubercles were seen in only one case. Since tubercle bacilli are probably present in all cases of pleural effusion, a tuberculous empyema may occur following pneumonolysis even in cases where pulmonary tissue is not injured. Fluid appearing after operation is probably mainly due to the response of the pleura to injury, perhaps a sensitizing reaction due to the release of additional tubercle bacilli, and actual infection and invasion of the pleura by bacilli at the time of operation. From the present figures, it appears that the danger of fluid is very slight and the operation does not add materially to the incidence of effusion occurring with pneumothorax alone.—*An Appraisal of Closed Internal Pneumonolysis in Pulmonary Tuberculosis, E. C. Drash, J. Thoracic Surg., April, 1938, vii, 411.*—(*L. F. B.*)

Pleural Effusion following Thoracoscopy and Cauterization of Adhesions.—This is one of the most frequent complications of a procedure now more and more frequently used. Although comparatively rare and generally small after simple thoracoscopy, they may be serious after the section of extensive adhesions. Mistal states that they are either "the consequence of defective sterilization," that is, contamination of the pleura by infection, or are caused by the opening of a tuberculous focus or by a pleural reaction after operation. They are reduced by proper choice of cases and improvement in operative technique. They are undesirable both because of the associated constitutional symptoms and also because latent contralateral lesions may become aggravated or intestinal or laryngeal complications appear during their course. They are sometimes useful in that they allow better compression of sclerous thick walled cavities not previously collapsable. Pleural reactions have been ascribed by Jacobaeus, Brissaud, Chandler, Tudor Edwards, Roberts, Unverricht, Mistal and others to the heat of the cautery, the heat of the thoracoscopic lamp, or chemical or physical irritation by smoke. However, haemorrhage or insufficient coagulation of tissue may play a part, as noted by Maurer, Coulaud and de Castiglione in 30 per cent of cases. Weber implicates the traumatic irritation of the trocar or inflammatory reaction about the site of attachment of adhesions. Important prophylactic measures include avoidance of prolonged operations, and too great application of heat. Complications are most frequent in very unfavorable and severe cases of disease. Serofibrinous effusions are most frequent and usually occur within a few days. The larger exudates, a minority, resolve slowly, are associated with both pain and constitutional symptoms and are probably due to the opening of tuberculous foci. In bad cases they develop into empyemata. They may not necessarily be related to the operation. Haemorrhagic effusions are nearly always caused by faulty technique, including vascular injury. These may either resorb or become purulent. Empyemata are fortunately uncommon. The more rapidly they develop the worse the prognosis. They are to be feared because of the association with impaired resistance of the patient, spread of disease in one or both lungs, pleuropulmonary internal or external perforation, impaired reëxpansion of contracted lung due to formation of a thick rigid sclerous wall of visceral pleura and progressive obliteration of the pleural cavity. Empyemata may follow opening of cavities in hollow adhesions, of superficial foci, or of parenchymal lesions, all of which may happen in severing either surface adhesions or strings with a conical pulmonary implantation. Even after invisible perforations the patient's condition may become rapidly serious, with vomiting, collapse and high and oscillating temperature. The purulent fluid is often secondarily infected or even putrid, containing anaerobes. Aggravated

tuberculous pleuritis, or "cold pleural abscess" (Gloyne, Rist) may develop into empyema. This type commonly contains many tubercle bacilli and also many leucocytes and lymphocytes but no other organisms. The development of cortical tuberculous lesions is facilitated by the constant contact with bacilliferous liquid. In the case of late purulent pleurisies subpleural lesions traumatized by stretching of bands are probably the seat of an evolutive spread, leading to ulceration and perforation. Exogenous empyemata are probably rare with proper technique. Certain septic infections, however, appear to be of haematogenous origin. Severe so-called malignant pyothorax (Burnand and Jacquerod), due to sudden violent pleural inoculation, may be followed by tuberculization of the lung, pulmonary perforation and bilateralization. In the case of a small perforation which closes spontaneously retrogressive changes to simple serous pleurisy may rarely occur. The morphology and pathology of empyema is discussed. In the treatment of effusions strict bed-rest is important, combined with cessation of refills as long as not obviously needed, avoiding irritation of the serosa. Later, when the inflammatory stage has passed, aspiration and air replacement are necessary, even though the fluid recurs. If an effusion is turbid a pleural lavage may be done with Lugol's solution, leaving in about 50 cc. In purulent effusions, the severing of adhesions is to be avoided except in cases of recurrent pleuritis without caseation. Haemorrhagic effusions should be aspirated as soon as one is sure the bleeding has stopped, as they resorb slowly and are liable to infection. Treatment of empyemata is always difficult. Aseptic tuberculous empyemata may resorb spontaneously leaving what Burton Wood terms an "irretractable pneumothorax." Lavage is especially indicated in the septic type and in tuberculous effusions with fistulae. Oleothorax may be tried, according to various methods. Pearson cautions against letting oil remain in the pleura longer than six months. Direct irradiation of the pleura by means of a special electrode through a cannula has been used by Mistal who recommends, however, nonirritating doses. Unfortunately in severe empyema we nearly always need to have recourse to major surgery. Usually in tuberculous empyema a pleurotomy should not be done and open pneumothorax must be avoided. In certain cases permanent drainage is necessary, nearly always ending in a thoracoplasty. Simultaneous general measures to improve resistance are indispensable. One observes on an average after pleurolysis 70 to 80 per cent exudates, of which 10 per cent are large, and the majority insignificant. Pleurolysis stimulates the resorption of preexisting exudates in half the cases. There are about 2 per cent haemorrhagic pleurisies. During the early years of this procedure 20 to 40 per cent empyemata were common. Now most of them can be avoided by good technique and proper selection of cases, so that at present there are about 2 per cent tuberculous empyemata and less than one per cent secondarily infected (septic) empyemata.—*Pleural Effusion after Thoracoscopy and Cauterization, O. M. Mistal, Tubercle, January, 1938, xix, 145.*—(*A. P.*)

Pregnancy and Oleothorax.—The conclusions reached by different workers on the effects of pregnancy and parturition on the evolution of pulmonary tuberculosis are remarkably discordant. The outlook of pregnant tuberculous women is greatly improved with properly coördinated medical and obstetrical care before, during and after delivery. Recently, there have been a number of favorable reports on the effectiveness of collapse therapy under these conditions, including even 17 cases of bilateral pneumothorax collected from the literature by Peters and Davenport (1937). Scadding here reports on a case of a woman treated by oleothorax in whom pregnancy supervened and believes it to be the only one on record. She was a housewife of 30 years of age, first admitted to the obstetrical department at Hammersmith Hospital, London, in 1935, nearly at term. A left artificial pneumothorax was induced a month later after delivery and was complicated some months later by pleural exudate and erythema nodosum. Obliterative adhesions developed and were a prime reason for substituting an oleothorax (sterile olive oil). A total of 1,000 cc. completely filled the pleural cavity. Improvement was marked, interrupted only by a subcutaneous cold abscess which was aspirated. In the spring of 1937, the patient again became pregnant and was delivered normally in February, 1938, termination being refused because of her religious convictions. At last observation she and her child were apparently well. —*Pregnancy and Oleothorax, J. G. Scadding, Lancet, June 11, 1938, ccxxxiv, 1329.*—(*A. P.*)

Relaxation of the Lung during Pneumoperitoneum.—Clinical observations seem to confirm the assumption that artificial pneumoperitoneum has a favorable effect upon certain types of pulmonary tuberculous lesions. This is attributed to the elevation of the diaphragm, which, in turn,

causes pulmonary relaxation. The changes in the lung are assumed to be similar to those following phrenic paralysis or artificial pneumothorax. Forty patients receiving pneumoperitoneum were studied roentgenologically, films being taken at maximum inspiration and expiration, before and after from one to twenty-three treatments of 500 to 1000 cc. of air. In all, 248 films were measured and analyzed. Upward displacement of the diaphragm by pneumoperitoneum is influenced by the tonicity and integrity of the diaphragm, the tonicity of the abdominal wall, pathological changes in or the surgical status of the lung, the type of breathing and the amount of air injected. It was found that pneumoperitoneum injections given at weekly intervals are likely to cause a sustained elevation of the diaphragm provided pathological changes do not obviate it. The greatest elevation obtained in inspiration was 7.3 cm. on the right side and 6.4 cm. on the left with 6.4 cm. rise on both sides during expiration. Figures representing the actual rise in the diaphragm following pneumoperitoneum were greater than those obtained in a similar roentgenological study of 30 patients receiving phrenic surgery. It is concluded, therefore, that artificial pneumoperitoneum given at regular intervals will produce relaxation of the lung sufficient to produce a condition favorable to the healing of tuberculosis lesions.—*Radiologic Measurements of the Apici-basal Relaxation of the Lung during Artificial Pneumoperitoneum Treatment, A. L. Banyai, Am. J. M. Sc., August, 1938, excvi, 207.*—(*G. F. M.*)

Therapeutic Pneumoperitoneum in Intestinal and Pulmonary Tuberculosis.—The first publication dealing with the treatment of tuberculous enterocolitis with pneumoperitoneum was that of Jelks (1922). Banyai began this procedure in 1929 and summarized his observations in 1931, during which time he treated 44 cases, including only patients who failed to show satisfactory response to dietetic and medical treatment. Salkin and others confirm Banyai's good results, stating that complete symptomatic relief was the rule in cases with slight or moderate intestinal involvement. Salkin attributes the benefit to the mechanical (inhibitory) effect of the injected air on nervous stimuli and intestinal spasm and peristalsis. Hyperaemia of the peritoneum may also be a factor. In 1934 Banyai published a report on the combined use of phrenic nerve block and artificial pneumoperitoneum in the treatment of pulmonary tuberculosis. In 1931 he discussed the feasibility of pneumoperitoneum alone for pulmonary tuberculosis. The elevation of the diaphragm might exert a favorable influence by limiting diaphragmatic excursion and by decreasing intrapleural pressure, thus increasing the pulmonary blood supply. Other authors reporting favorably were Vajda (1933), Centoscudo (1936) and Trimble and Wardrip (1937). All have found that injections of 400 to 1,500 cc. of air at weekly intervals cause a sustained elevation of the diaphragm, usually two inches or more, relaxing both lungs. An ordinary artificial pneumothorax apparatus is used. The abdominal site of puncture selected is usually about three fingers breadth below and to the left of the umbilicus. The bladder should be emptied beforehand and cough controlled. The Floyd-Robinson type of needle is preferred. Slow insertion is advised, disappearance of resistance indicating entry into the peritoneum. The manometric readings are neutral and not very helpful at the initial injection; later there is oscillation on the positive side. A slanting type of table is advised. After injection of about 300 cc. of air the patient is usually conscious of a dull pain in the shoulder and lower chest. Pain and tension are more marked in the upright position. Fluoroscopic examination is most valuable. The initial dosage is 400 to 1,000 cc. and treatment is continued a few months to two years. Symptomatic relief is often striking, exhaustive and unproductive cough being often promptly abated and toxaemia lessened. Patients readily adapt themselves to increased abdominal pressure. Attempts are not made at this time to evaluate the curative results.—*Therapeutic Pneumoperitoneum, A. Banyai, Tubercle, January, 1938, xix, 176.*—(*A. P.*)

Phrenic Nerve Interruption and Gastrointestinal Symptoms.—Gastrointestinal symptoms may follow phrenic interruption and the syndrome is different on the two sides. On the left, it is characterized by decreased appetite and feeling of fulness often associated with nausea and vomiting. There is a notable absence of pain. On the right, the syndrome is characterized by pain in the right upper quadrant and symptoms suggestive of gall bladder disease. Occasionally there is decreased appetite, distention and nausea. Anatomical changes can be demonstrated which account for the symptoms. Following left phrenic interruption, the pylorus of the stomach is moved to the left from 2 to 6 cm., and down an average of about 2 cm. The fundus is raised and distended. The stomach is suspended perpendicularly and the pylorus bent to an acute angle so that the pyloric portion

forms a separate loculation. Following interruption on the right, the pylorus is moved 2 to 3 cm. to the right and 4 to 5 cm. higher. The stomach lies in a transverse position with the fundus narrowed and the normal gas bubbles absent. In most cases a constriction occurs at the midportion of the stomach. Symptoms following temporary phrenic surgery tend to be transient whereas following exairesis the symptoms may persist for a number of years and definite pathological changes may be produced. One hundred and seventy-three cases were reviewed, 44 of which were interviewed personally. Of the 44 cases, 33, or 75 per cent, gave a definite history of gastrointestinal disturbances attributed to the operation. In 12 it was severe, 10 moderate, 11 mild, and in 10 cases none. There were 22 cases from the remaining 129, and their symptoms were severe or moderate. In the 12 cases symptoms were considered severe because they were impairing the patient's progress. There were 41 patients with temporary phrenic surgery and in none of them did gastrointestinal disturbance persist after the function of the diaphragm returned. Of 14 patients who had permanent paralysis, 9 had symptoms when discharged from the sanatorium. In 2 cases in which duodenal ulcer developed there had been left phrenic exairesis. Clinically significant gastrointestinal symptoms appear in about 25 to 50 per cent of cases following phrenic nerve interruption. Temporary interruption of the phrenic is advised in preference to permanent exairesis.—*The Effect of Phrenic Nerve Interruption on the Gastrointestinal Tract, F. R. Harper, J. Thoracic Surg., April, 1938, vii, 398.*—(*L. F. B.*)

Phrenic Nerve Interruption in Pulmonary Tuberculosis.—Phrenic nerve operation was performed in 143 cases by either phrenicectomy, by crushing the nerve or by alcoholization, with and without scalenectomy. In most of the cases result of the operation was obtained immediately following the procedure, Temporary paralysis in these cases lasted from two months to two years. When using the method of avulsion, paralysis of the hemithorax occurred regardless of the length of the resected portion of the nerve. While paralysis occurred following resection of only two cm. in another case the resection of 42 cm. of the nerve failed to produce the expected result. In several cases complications of the digestive, nervous and circulatory system were observed. These, however, proved to be without substantial harm to the patient. Out of 122 cases where a follow-up examination was made, 69 patients were males and 53 females, 101 patients were white and 21 were colored. Seven children of 10 years were operated upon and the age of the adult patients ranged from 18 to 50 years. Neither age, nor race, nor sex, nor an additional scalenectomy have appeared to make any difference in the results. The results of phrenic nerve operation on the right side are more successful than those on the left. Forms of localized fibrocaseous pulmonary lesions with well delineated cavities of the upper lobes, especially those in the infraclavicular and juxtahilar regions, are most benefited by the operation. Besides pneumothorax, phrenic nerve interruption has its well established indication in cases of apical and diaphragmatic adhesions provided that the pulmonary tissue has not lost its capacity of contraction. Where the elastic contractability of the parenchyma was seriously damaged as in cases of extensive lobar involvement and of large cavities the results were poor or none.—*La paralisis frenica en el tratamiento de la tuberculosis pulmonar, G. B. Duran & A. N. Sierra, Rev. de tuberc. d. Cuba, April 2, 1938, I, 179.*—(*F. G. K.*)

Collapse Therapy in Pulmonary Tuberculosis.—The term "compression" sometimes used in connection with collapse therapy is a misnomer, and, if actually aimed at, highly dangerous. Collapse therapy was originally restricted to unilateral, mainly cavernous tuberculosis but it has since been recognized that bilateral active lesions can be successfully treated by varied methods. One must not overlook the often surprising spontaneous tendency toward cure. *Artificial pneumothorax:* In the presence of recent diffuse infiltration with moderate or slight cavitation and a positive sputum and fairly good general condition without substantial improvement of the lesion under strict conservative treatment for two or three months, this is the obvious choice. In the majority of such cases, with involvement of the upper part of the lung, serious pleural exudates are rare and eventual satisfactory reëxpansion of healthy lung tissue is to be expected. Where there are adhesions, limited and localized, their division should be carried out; if this is impossible, controlled refills may be continued for a time but if a cavity persists other procedures must be considered. *Thoracoplasty:* When compelled to admit that, due to adhesions, a successful pneumothorax is impossible, other measures are to be considered. Thoracoplasty demands consideration of the patient's general resistance and, if inadequate, it must first be raised. Broadly speaking, subjects for this should not be over fifty years old,

with exceptions, nor have been ill over ten years. Extrapulmonary foci are not absolute contraindications but call for caution. Nontuberculous organic disease of heart or kidneys must be seriously weighed. *Phrenic nerve operations:* Diaphragmatic paralysis, once popular, has resulted in so many failures and undesirable sequelae that the indications are now quite limited. We are now usually content with either crushing or nerve blocking with alcohol, producing temporary paralysis. In the presence of lower lobe tuberculosis or midzone cavities, avulsion may be considered. The procedure can also be tried when advanced age, poor condition or disease of other organs render major surgery out of the question. *Bilateral collapse:* Clear indications for this procedure are quite limited and overenthusiastic intervention is to be deplored. When however, sudden flare-ups of disease occur in the contralateral lung in the course of pneumothorax, and progress, one should not hesitate. *Plombage* is indicated especially in the presence of localized apical lesions with massive adhesions. It does not necessarily preclude other collapse measures for the other lung. In the presence of large cavities, apical thoracoplasty is to be preferred.—*Indications for Collapse Therapy in Pulmonary Tuberculosis, W. Behrens, Lancet, January 22, 1938, ccxxxiv, 190.*—(*A. P.*)

Time Indications for Collapse Therapy Procedures.—Marshall's practice is to attempt induction of artificial pneumothorax in every case with cavitation demonstrable by X-ray, unless there is a definite contraindication, such as deficient total lung capacity with widespread fibrosis, generalized emphysema or old age. Large superficial cavitation, likely to rupture into the pleura, is probably a contraindication, while extensive contralateral infiltration is generally a good reason for delay. In a number of such cases preliminary rest and injection of gold salts may put the patient in better condition for later pneumothorax. Extrapulmonary complications, such as laryngeal or intestinal ulceration, are rather an indication for more prompt collapse therapy. Air replacement of pleural effusion is postulated on the probability of later pulmonary developments; however, one objection is that the pleurisy is apt to be more prolonged and the visceral pleura thickened, while there is no guarantee of prevention of pulmonary disease and excavation; if this occurs in the contralateral lung, there will be a functional handicap, hence it is better to reserve the method for cases with demonstrable underlying disease. Relaxation of cavities must be obtained to accomplish results. Where these are in the upper zone, adhesions commonly prevent it. It is wise usually to cease refills if the pneumothorax cannot be made truly selective within a few months. Adhesions should be divided as soon as their appearance indicates that this may be done without undue risk. When adhesions are so widespread that their division is impossible, alternative methods, such as phrenic interruption, apicolysis and thoracoplasty, are to be considered. As to pneumothorax, the appearance of new areas of inflammation should cause us to hasten and not delay intervention. Although phrenic interruption itself is seldom formidable, a disadvantage is the delay in restoring the *status quo* if unsuccessful. Marshall now inclines to advise phrenic evulsion in cases with a single cavity of moderate size near the apex, with pneumothorax impossible and no gross contralateral disease, and has seen some good results with complete healing. Thoracoplasty still remains the most successful procedure in dealing with cavities which cannot be successfully treated by pneumothorax with its adjuncts. The most common fault is probably too early operation and the physician is more often to blame than the surgeon. There is certainly a marked temporary lowering of resistance. Gravesen has emphasized that thoracoplasty should not be done in the presence of active spreading disease, that it has no vital indications and that its effects are essentially mechanical, hence it should be postponed until resistance is sufficiently raised and usually preceded by prolonged medical treatment and careful observation.—*How Long Should Collapse Therapy be Delayed?, G. Marshall, Tubercle, October, 1937, xix, 19.*—(*A. P.*)

Indications and Contraindications in Thoracic Surgery.—Phrenic avulsion is a rather crude and clumsy procedure not entirely devoid of danger. In the past its use has been too frequent and the pendulum has now swung the other way. Phrenic nerve interruption, however, may be helpful in closing lower zone cavities or relaxing tensed adhesions attached to them, being thus a partial alternative to internal pneumonolysis. In 40 cases of his own where used as supplementary to artificial pneumothorax it has resulted in apparent closure of cavities in about 50 per cent. Proper relaxation, however, can only be secured by it when the lung is anchored or held by adhesions at the apex and base. Internal pneumonolysis demands a natural aptitude for fine work and considerable skill, obtainable only by experience. At least three or four endoscopic operations a month are

needed to keep the surgeon properly fitted and rare occasional operations, as might be the case in small institutions, should not be undertaken. On the other hand, a large proportion of pneumothorax cases cannot be properly managed without the procedure. An ineffective pneumothorax should either be made effective or abandoned. In external pneumonolysis by plombage, if an anterior approach is employed and wax introduced after pleural stopping, the wound usually breaks down later and extrudes it, leaving a granulation-lined cave. The technical difficulties of posterior approach are greater and the resultant scarring, if the operation fails, may make further rib resections impossible. In England, apicolysis and plombage may be said to have been tried and found wanting. Thoracoplasty is at best a cruel necessity. The difficulty of eradicating disease from a system of communicating tubes, even after complete extirpation, is shown by the relapses occurring after lobectomy for bronchiectasis. Broadly speaking, thoracoplasty is only suitable for stabilized fibrotic disease with cavitation not controllable by pneumothorax or internal pneumonolysis and the time to operate is during a period of temporary arrest or quiescence such as punctuate the course of chronic phthisis, that is, we must "strike while the iron is cold," not hot. There is no warrant for claiming that thousands of lives have been saved by thoracoplasty, as statistical evidence does not indicate that the mortality rate from phthisis has been sensibly reduced by the general adoption of pneumothorax (or collapse therapy in general). Thoracoplasty should not be regarded as a standard method of treatment for pulmonary tuberculosis but as a special measure applicable to the relatively small proportion of cases in which spontaneous healing is prevented by mechanical obstacles to contraction of fibrous tissue and obliteration of dead space. No form of collapse therapy will prevent haematogenous dissemination but, when this occurs in the course of pneumothorax, treatment can be modified accordingly, whereas the results of thoracoplasty are irrevocable.—*The Use and Abuse of Surgery in the Treatment of Pulmonary Tuberculosis, W. B. Wood, Brit. J. Tuberc., October, 1937, xxxi, 276.*—(*A. P.*)

How Long Should Collapse Therapy Be Delayed?—Is a lesion healed by bed-rest and sanatorium regimen alone more or less likely to recur than if healing has been aided or encouraged by collapse therapy? In the case of pneumothorax some anxiety always exists lest cavities reopen on reëxpansion of the lung, whether intended or otherwise. With a truly thoracoplasty there is little doubt as to the permanence of healing but such assurance does not exist with a partial thoracoplasty. It remains to be seen whether Semb's method of relaxation of the apex will obviate later misfortunes. In the case of phrenicectomy definite improvement often occurs after the paralysis with, quite often, relapse later, even without recovery of muscle function of the diaphragm. Although this occurs especially when cavities have been reduced but not obliterated it has also occurred after they appeared to have been obliterated. It may be categorically stated that bed-rest is the basis of all treatment, and there is no invariable sequence of treatment, that is, failure to establish an artificial pneumothorax is not necessarily followed, either immediately or later, by phrenicectomy and thoracoplasty, even with unilateral lesions; also the use of thoracoplasty is essentially reserved for the more chronic productive type of lesion and is contraindicated during the acute phase. This generally holds also for phrenic nerve interruption and, as the chief value of the latter lies in abolishing the inspiratory or vertical pull of the diaphragm, its most frequent indication, aside from an accessory to artificial pneumothorax, is for disease of the upper lobe and apices. As the contractile force of fibrous tissue is more powerful than of normal elastic tissue, it is generally advantageous to await the establishment of fibrotic changes. On the other hand, a caseating middle or lower zone lesion, especially if causing repeated haemoptyses and if uncontrollable by pneumothorax, may be an urgent indication, the benefit here resulting from general pulmonary relaxation. The general aim in combating tuberculosis is to increase resistance, hence each case must be individualized and the proper time and measures selected according to judgment. It must be admitted that these auxiliary forms of treatment at first tend to lower resistance. There are dangers in waiting too long. Metastatic spread, however, is a risk all run, and it must not outweigh the necessity for getting the patient into as fit condition as soon as possible for a major operation. It does not justify hurriedly submitting patients to thoracoplasty for small lesions which might reasonably be expected to heal without such formidable procedures. In public institutions, especially, there is a tendency for preliminary observation to be reduced to a minimum and possibly this increases the risks and the proportion of failures. Persistence of cavitation is possibly the greatest single indication for

accessory surgery. It is only the soft or comparatively recent cavities that can heal spontaneously, although one surrounded by a consolidated zone will occasionally disappear rapidly as this becomes absorbed.—*How Long Should Collapse Therapy be Delayed? H. M. Davies, Tubercle, September, 1937, xviii, 544.—(A. P.)*

Bilateral Collapse Therapy.—Among 211 patients in whom bilateral pneumothorax was attempted a free space was found bilaterally in 152, a free space on one side only in 49, and no space on either side in 10. This incidence of free space compares favorably with 520 cases of attempted unilateral pneumothorax, even though 95 per cent of the bilateral cases had far advanced disease. The interval between bilateralization averaged ten months. A reasonably liberal interval of observation was allowed because an effective collapse was desired on the first side before starting the second. If pneumonolysis were necessary it might be hazardous in the presence of bilateral pneumothorax, varying amounts of relatively uninvolved lung may need to be collapsed to establish a satisfactory pneumothorax, and the lesion in the contralateral lung may improve spontaneously when the first is brought under control. It is not advisable to induce both sides the same day or the same week. Of 57 patients with effective bilateral pneumothorax, 45, or 79 per cent, are able to work or are ambulatory. The incidence of effective bilateral pneumothorax was 37 per cent as against 38 per cent for 398 cases with unilateral collapse. Pleural effusion developed in 50 per cent of the cases or 25 per cent per pneumothorax. Among 28 cases that received a combination of procedures on the two sides because bilateral pneumothorax could not be obtained, results were not so favorable. The patients fared better when the measures in the combination were applied alternately. It is believed that unless the lesion in the lung is truly apical, bilateral thoracoplasty can rarely be successful. Of all forms of bilateral collapse therapy, pneumothorax is the most effective, results with it are as good as those with unilateral pneumothorax, and the frequency of complications is about the same.—*Bilateral Collapse Therapy in the Treatment of Pulmonary Tuberculosis, B. P. Potter, Arch. Surg., July, 1938, xxxvii, 132.—(L. F. B.)*

Collapse Therapy in Fifth and Sixth Decades.—A review of 154 cases was made to determine the effect of various collapse measures on patients between the ages of forty and sixty years. Nineteen of the group were over fifty years old and 122 were males and 32 were females. Among the entire group, 171 operations were performed. The disease had been recognized and treated for periods of six months to twenty years. About 50 per cent of the patients had productive lesions, 25 per cent were mixed, and 25 per cent were predominantly exudative. About 25 per cent were moderately advanced and the remainder far advanced. In about one-half of the cases the equivalent of one lung was diseased and about one-half of the cases had bilateral lesions. Cavitation was present in 106 and about one-half of them were thick walled on X-ray appearance. Clinical results represent treatment carried out on 114 patients from six months to two years, on 25 patients from two to five years, and 15 for a period of from five to ten years. In general from this series it is to be expected that not more than 20 per cent will ultimately be well and able to work, 25 per cent will be improved and able to do part-time work, 25 per cent will be unimproved, and the remaining 30 per cent have already died or soon will die. Compared with similar results for the age of twenty to forty years there is a difference of 10 to 15 per cent in less favorable response. Artificial pneumothorax was induced in 78 cases and carried to completion in 20. Based on the entire number of operations, 16.6 per cent became arrested, 24.5 per cent improved, 32 per cent had no benefit, and the mortality was 26.9 per cent. Effusions did not develop more readily than in younger persons. Phrenic nerve operations were done on 73 occasions. Thirty-four thoracoplasty operations were done on 17 cases. Arrest of disease was obtained in 2 and improvement in 6. Based on the number of operations, operation mortality has been about 6 per cent. Plombage was undertaken on 3 cases, 2 of whom were markedly improved. The operative hazard, except for thoracoplasty, of surgical procedure is not greater after forty years of age. The greater risk of thoracoplasty seems due to lowered threshold of resistance and vitality, extent of lesions in the lungs and the condition of the cardiorenal-vascular system. Collapse therapy for patients over forty years of age is of great value although expectations are not realized to the same degree and returns are less satisfactory than in earlier age groups. Satisfactory collapse with artificial pneumothorax will be obtained in a smaller percentage of cases but should be tried as a primary procedure because of its safety. Phrenic nerve operations show the best returns in suitable cases. Plombage is a valuable adjuvant in this age group. Thoracoplasty is needed and should be used but with greater precaution than in earlier age

groups.—*Experience with Collapse Therapy for Pulmonary Tuberculosis in the Fifth and Sixth Decades, H. R. Decker, J. Thoracic Surg., April, 1938, vii, 351.*—(*L. F. B.*)

Management of Mobile Mediastinum.—A shifting mediastinum is encountered in most cases in which pneumothorax is established and maintained for a time and as a rule is of little importance but in a small group of patients is a definite obstructive factor in the closure of cavities. In 600 consecutive cases, artificial fixation of the mediastinum was necessary in 60 and in an almost equal number of cases advantage was taken of a spontaneous pleuritis to produce fixation. A mobile mediastinum is an important factor in the mechanism of spreading of disease and death from mediastinal flutter following thoracoplasty. After the mediastinal structures are allowed to return to mid-position, a liquid irritating medium is injected into the pleural cavity and the patient requested to lie on the sound side for an hour or so. Ten to 15 cc. of 2 per cent or 5 per cent gomenol in paraffin oil was used early in this work but at present is used only when mineral oil fails to produce pleuritis with effusion. The subsequent rise in temperature to 103° or 104°F. subsides in from seventy-two hours to several days. In only 5 of the 60 cases was it necessary to aspirate fluid. The pleural space must be maintained while stiffening of the mediastinum is taking place being careful not to displace the mediastinal structures. Of the 60 cases, complete fixation was obtained in 46, and partial fixation in 14. In 15 cases, having received this treatment, the pneumothorax was voluntarily discontinued, resulting in complete reëxpansion of the lung in 14. The maintenance of constant pressure pneumothorax, by giving frequent refills, prevents obliteration of the pleural space when there is a tendency for this to occur.—*Management of the Excessively Mobile Mediastinum in the Surgical Collapse of Tuberculous Pulmonary Cavities, B. P. Potter, J. Thoracic Surg., April, 1938, vii, 382.*—(*L. F. B.*)

Results of Thoracoplasty.—At the hospital-sanatorium at Aincourt, a small percentage (3.3 per cent) of the patients were considered suitable for thoracoplasty. The operation was performed on 35 patients in 1935 and 1936. Clinical, bacteriological and roentgenological cure was obtained in 70 per cent, with no operative deaths. Two patients died of progressive tuberculosis, eighteen and twenty-four months, respectively, after operation, and 2 patients with empyema died some months after thoracoplasty. The causes of failure in the 7 other patients with unsatisfactory result are discussed by the authors. The freedom from operative mortality is attributed to the practice of excising the first rib only as a trial in doubtful cases. The results of thoracoplasty as an adjunct to a partial pneumothorax were particularly good. Six months postoperative sanatorium care is considered essential.—*Étude critique des résultats de deux ans de chirurgie pulmonaire en sanatorium public, P. Dreyfus-Le Foyer, R. Etienne, C. Brunet & O. Renié, Rev. de la tuberc., February, 1938, iv, 130.*—(*H. L. I.*)

Apical Topographical Thoracoplasty.—The authors made a study of all their cases of apical thoracoplasty at the Leysin Sanatorium, in order to evaluate this form of treatment. The series of 106 cases does not include cases in which complete thoracoplasty was done. In only two instances were more than seven ribs resected; 56.6 per cent had four, five or six ribs resected; 37.8 per cent had seven or eight ribs resected; 4 per cent died after the first stage and 2 cases subsequently had the eighth rib resected. Clinical recovery with disappearance of bacilli in the sputum was obtained in 55.7 per cent of the cases, 18 per cent were improved or remained stationary, a few of these were progressive. The total mortality was 26.4 per cent. The operative mortality of 8.3 per cent included 4.5 per cent due to shock and 3.8 per cent due to infection of the operative field or perforation of a large subpleural cavity at the time of operation. There were 23 postoperative pulmonary complications (21.5 per cent), 11 were fatal. The majority of the postoperative complications were extensions of the tuberculosis into healthy lung on either side. The authors feel that paralysis of the homologous diaphragm preceding the thoracoplasty favors postoperative pulmonary accidents, such as homolateral spreads into the base especially in cases with fibroulcerative apical lesions. An analysis of the failures revealed that some of these were due to resecting an insufficient number of ribs and insufficient length of the ribs resected. Another reason for failure is delaying too long between stages, permitting ossification to occur and thus limiting the degree of collapse desired. It is certain that too brief a residence in the sanatorium prior to operation results in certain failures. This involves the law of Donders, whereby rest permits compensatory dilatation of the healthy tissue and maximum contraction of the diseased area. This principle, evident in selective pneumothorax, seems to be the greatest

justification for a topographical thoracoplasty which saves the healthy tissue below an apical lesion. The principal contraindications for a strictly topographical resection are lesions adjacent to the mediastinum and isolated cavities. The chief indication is a fibroulcerative lesion of the apex with a retractile tendency, producing a honeycombed shadow on the roentgenogram. Another indication is a dense lobe containing a large excavation in the outer portion. The method gives excellent results in apical cavities encircled by the first rib. The authors believe that an early lesion is an excellent indication for extrapleural pneumothorax. The chief disadvantages to this form of treatment are the difficulties in initiating and maintaining it and in the severity of the collapse which favors spread of the disease into healthy lung, especially if the cavity contains considerable secretions. However, these disadvantages were apparently trifling in 150 cases of extrapleural pneumothorax performed at the Leysin Sanatorium. An old, dense, fibroulcerative lesion with a retractile tendency will always reside in the realm of thoracoplasty and especially the fibrous apex which is suitable for a topographical thoracoplasty. On the contrary, lesions adjacent to the mediastinum, or isolated apical cavities, should be treated by extrapleural pneumothorax.—*La thoracoplastie supérieure topographique, l'avenir de la méthode; thoracoplastie partielle et pneumolyse, J. Morin, D. Michetti & F. Dwelshauvers, Arch. méd. chir. de l'app. respir., 1938, xiii, no. 1, 24.*—(*J. E. F.*)

Extrafascial Apicolysis.—Since about 90 per cent of tuberculous cavities occur in the upper lobe and some of these cannot be collapsed even by very extensive thoracoplasties, it has been necessary to bring about the closure of these cavities in some other manner. In 1932 Semb found that the entire apex could be mobilized extrafascially by its separation from three groups of suspensory ligaments. This allowed for vertical collapse while the accompanying rib resections added the necessary lateral collapse. The postoperative care of patients on whom this operation is performed is very important because the procedure is accompanied by more shock than that which occurs following an ordinary first stage thoracoplasty. A series of 65 cases operated upon by Gale's modification of the Semb operation showed a mortality of 7.6 per cent. There was an infection of the wound in 19.6 per cent of the operations in which the wound was drained, and in 5.9 per cent that were not drained. The occurrence of postoperative atelectasis seemed to be about twice as common in the cases in which there was a paralyzed diaphragm at the time of operation, as in those in which the diaphragm was not paralyzed. The convalescence was much less stormy in those patients who had a preoperative vital capacity of over 35 per cent of normal than in those who had a lower vital capacity. It was also noted that the slower the sedimentation rate the more likely the patient was to have an easy convalescence. Those patients who had a differential white blood count showing more than 70 per cent polymorphonuclear leucocytes also had a more stormy postoperative course. The operation resulted in the closure of the cavity in 88 per cent of the cases and in 80 per cent the cavity was closed and the sputum was negative. Eight patients had revision operations, and three of them died.—*Extrafascial Apicolysis (Semb), J. W. Gale & P. A. Midelfart, Surgery, February, 1938, iii, 234.*—(*H. W. H.*)

Partial Thoracoplasty.—The technique of anterior chondrocostectomy, preliminary to posterior thoracoplasty, wherein the costal cartilages and small sections of the first, second and third ribs are removed, is described. At the same time the rib is detached well posteriorly along its lower border with the periosteal stripper. A single short incision over the second rib is usually used. Forty-two patients so treated since March, 1934 are reported. Their ages ranged from twenty to fifty-nine years and 12 were over forty. Seventeen were males. On the 42 patients, 146 operations were performed, 18 having 3 operations and 19 having 4, 1 patient each had 1, 5 and 6 operations, and 2 patients had 2. The number of ribs resected varied from two to eleven. Twelve patients had ten ribs resected and one had eleven. Of this group, six months to three years after thoracoplasty, 21 are improved, sputum negative, and cavity closed; 9 improved, sputum positive, and cavity open; 4 are unimproved; 3 dead; 5 not followed but known to be living. In the first group of 21, 7 are working. Horizontal staging of operations, with preliminary chondrocostectomy, has several advantages. The anterior stage is least formidable and provokes less postoperative reaction than other thoracoplasty procedures and permits early performance of upper posterior operation. Removal of ribs through a posterior incision is easier following the preliminary anterior resection. Scar tissue reaction provoked by anterior resection appears to aid definitely stabilizing the mediastinum. In 10 cases extrafascial apicolysis, according to Semb, was done. In a few cases brilliant results were obtained but whether this procedure further improves the final result is still open to question. The employment of external compression in the

postoperative period serves to augment the degree of collapse.—*Partial Thoracoplasty for Pulmonary Tuberculosis, O. H. Wangensteen, H. A. Carlson & W. F. Bowers, J. Thoracic Surg., April, 1938, vii, 365.*—(*L. F. B.*)

Thoracoplasty with Extrafascial Apicolysis.—Three requirements are proposed: (*1*) The ideal procedure should cause complete collapse of the cavity. (*2*) It should cause a selective collapse of the cavity. (*3*) The operative risk should be small, not over 1 to 3 per cent mortality. Complete collapse of the cavity is needed because an open uncollapsed cavity represents a potential danger of spreading the disease. So-called "immobilization of the lung" by thoracoplasty, with incomplete collapse, has never been shown to cure pulmonary tuberculosis in a large series. Cases with persistent cavities sooner or later produce positive sputum. In patients with positive sputum after thoracoplasty a cavity is usually demonstrable roentgenographically. Selective thoracoplasty is indicated because, even before operation, these patients have diminished respiratory function and need to preserve healthy lung as much as possible. A too extensive collapse at the first operation may preclude bilateral treatment and Morriston Davies has shown that an extensive thoracoplasty is more dangerous than a limited one. In a chronic disease a low mortality rate is essential. A high operative risk not only frightens the patient but makes him postpone the operation until a terminal stage. "It is better to live with a cavity than die without one." The localization of cavities plays a part in the question of selective thoracoplasty. From Semb's figures, based on 177 cases chosen for thoracoplasty, 90 per cent need only partial collapse of the upper lobe, 10 per cent total thoracoplasty. Lateral films make it possible to visualize three areas, anterior, medial and posterior. Of 102 unselected cases, 84 per cent of cavities involved the posterior area and usually to some extent the medial; none was localized in the anterior area only, therefore the main question in thoracoplasty is to produce collapse corresponding to the diseased part of the lung, that is, the upper and posterior region. Sauerbruch's (1930) total paravertebral thoracoplasty produces a collapse mainly from the side. This is often incomplete, nonselective and even contraselective as regards upper lobe cavities. To obtain better collapse Alexander (1932) and Maurer (1935) advocate rib resection far beyond the limits of the cavitation, making the operation less selective, and they include transverse processes. None of these methods can in all cases produce sufficient collapse of upper lobe cavities as they fail to reproduce the successful mechanical effect of artificial pneumothorax. The lung, even after extensive rib resection, remains fastened upwards, medially and posteriorly by adhesions, preventing it from retracting downwards. In order to produce free mobilization of the upper lobe, thoracoplasty should generally be combined with apicolysis. Such combination has been tried by Bull (1930), Lilienthal (1937), Sauerbruch (1930), Nissen (1931), Holst (1932) and Lauwers (1929), as in so-called "extrapleural apicolysis," a blunt separation of parietal pleura from chest wall, but the method has these disadvantages of being difficult, dangerous or impossible, and of producing an incomplete collapse. Therefore, Semb prefers a more external separation, outside the endothoracic fascia, in the extrafascial plane. "Suspension bands" from this fascia fasten the lung to the neurovascular trunk, vertebrae and mediastinum. These are dissected free and divided. Thus a radical apicolysis has been successfully effected in a series of over 250 cases without a failure. The extrapleural cavity formed becomes filled with exudate and air, producing an immediately effective collapse. When the exudate is resorbed, in the course of one to two months, the lung will gradually expand again, hence *the ribs should be resected thoroughly* according to the extent of the apicolysis or the thoracic dome. Attempts to fill the dead extrapleural space have been generally unsuccessful. The periosteum of the ribs, however, should not be stripped off the lung surface to any great extent. The intercostal muscles, nerves, vessels and fascia should be severed from their vertebral attachments and eventually from the sternum according to the extent of the apicolysis. A portion of the lung thus liberated, with its covering of endothoracic fascia, periosteum and muscles, retracts to the bottom of an "extrafascial space." This retracted portion may then be subject to the same laws as the collapsed lung in pneumothorax, the surrounding exudate and air temporarily preventing it from attaching itself to the surroundings and expanding. In the course of one to three months fibrous tissue slowly develops from the fascia and the ribs are regenerated while the lung is retracted, keeping it fixed. The technique of this operation is described. Phrenic nerve evulsion should not be done previous to a thoracoplasty. Diaphragmatic paralysis sacrifices the frequently sound lower lobe, giving a contraselective collapse. It not only precludes the advantages of selective apical collapse but may preclude any necessary intervention on the other side. Diaphragmatic paralysis definitely increases the risk of pulmonary complications after thoracoplasty

(Holst, Semb and Frimann-Dahl, 1935), probably by interfering with effective cough. This may result in a drowned lung. Presence of air in bronchioles and alveoli and active inspiratory ability are necessary in order for cough to force secretions out of the bronchi. If phrenicectomy is to be done supplementary to thoracoplasty it is far better to do it afterwards. The postoperative mortality rate definitely increases with the number of ribs resected in one stage, especially if six or more, and postoperative reactions are similarly influenced. The reaction after resection of three or four upper ribs plus apicolysis in one stage is relatively slight. Pulmonary complications are also influenced by paralysis or fixation of the diaphragm and the condition of the mediastinum. In second or third stage operations the risk of pulmonary complications is small provided these are not too extensive. Infection of the extrafascial space is sometimes seen, especially if prolonged drainage of the wound is used. The selective collapse and low mortality make it possible to extend the indications for thoracoplasty to many cases of unsatisfactory pneumothorax. A contraselective artificial pneumothorax gives bad late results (Sinding-Larsen, 1937). The mortality rate within two months of operation by this method is approximately 3 per cent. Cavity collapse and sputum free of tubercle bacilli were achieved in about 90 per cent of those surviving. However, some of the follow-up reports are very recent. Of all cases, 90 per cent had resection of eight ribs or less and only 10 per cent a total thoracoplasty. In 17 cases pneumothorax had been induced on the other side and 14 of these did well. Complete collapse of cavity was obtained in 14 out of 16 patients who had been previously operated on without complete success.—*Thoracoplasty with Extrafascial Apicolysis, C. Semb, Brit. M. J., October 2, 1937, 650.*—(*A. P.*)

Thoracoplasty and Contralateral Pneumothorax.—During the past five and one-half years 85 patients have undergone 207 stages of thoracoplasty while collapse by pneumothorax was maintained on the contralateral side. The type of thoracoplasty done was that described by O'Brien in 1933. The degree of pneumothorax collapse averaged approximately 20 per cent but in certain cases was increased to 35 or 40 per cent of the lung volume. Thirty-seven, 43.5 per cent, of the cases had exudative disease in the contralateral lung, 23, or 27.06 per cent, had a mixed type of disease, and 25, or 29.4 per cent, had productive disease. Cavity from 1 to 5 cm. was present in 51 of the 85 cases. Of these, all but 5, or 90.2 per cent, closed. Pneumothorax is still present in 27 of the original 85 cases and the disease in 22 of this group is controlled and has increased under the pneumothorax and since thoracoplasty in 5. In 76 cases, including 9 immediate deaths, contralateral disease was controlled in 59, 77.63 per cent, and extended in 17, 22.39 per cent. Complications of the pneumothorax were few. Although fluid was present in 25.8 per cent of cases, in only 10 did it require aspiration. Seven patients developed tuberculous empyema. Spontaneous pneumothorax developed in 4 cases. Cavity was present in 84 of the 85 patients undergoing thoracoplasty. The number of stages varied from 1 to 5. There was an immediate mortality of 9.4 per cent. Cavities closed in 58 of the 76 patients surviving the operation. Sputum was converted in 52. At the present time 19 cases are arrested and are working or able to. Eight are apparently arrested and 2 of these are working. Thirteen are quiescent, 23 improved, 2 worse, 18, or 21.1 per cent, dead, and 2 are untraced. As a whole, this group of patients were exceedingly poor risks. It was impossible to complete thoracoplasty in 10 cases and, of these, 6 are now dead. It was found that results were better when frequent small pneumothorax refills were given. It appears to be better practice to establish the pneumothorax on the contralateral side before subjecting the patient to thoracoplasty. The optimum time for doing thoracoplasty depends to a large extent on the amount of disease present, and may be said to be when it becomes apparent that the contralateral disease can be controlled or when cavities are closed or closing. Thoracoplasty, also, should not be delayed too long. It appears that the use of pneumothorax as a therapeutic measure in the treatment of disease in the contralateral lung simultaneously with the performance of thoracoplasty is a justifiable and useful procedure.—*Extrapleural Thoracoplasty in the Presence of Contralateral Pneumothorax, E. J. O'Brien, W. H. Tuttle, J. C. Day & J. P. O'Connor, J. Thoracic Surg., October, 1938, viii, 1.*—(*L. F. B.*)

Apicolytic Thoracoplasty.—To overcome the tendency of the apex of the lung to rise after operation, the posterior ends of the divided intercostal bundles and periosteum are sutured to the neck of the first intact rib. The divided fibres of the serratus magnus are sutured to the upper edge of the first intact rib and the sacrospinalis. The wounds are closed without drainage since it was found that infection occurred three times as frequently in the drained cases. It is more satisfactory to do the anterior stage second. A series of postoperative compression procedures has been used in every case. Of the

102 cases in the series, 23 were between thirty-five and forty-five years old and 13 were over forty-five. Many were clinically active and many had extrapulmonary disease. The contralateral lung was involved in 84 per cent of the cases, in 27 per cent of which the lesion was advanced. Collapse of the lesion was satisfactory in 70 per cent of the cases. In cases with cavitation, 62 per cent were closed, while 77 per cent were called closed or indefinite, and 23 per cent were decreased in size. Large cavities, 6 cm. or more, were satisfactorily closed in 45 per cent of these cases. Examination of at least two sedimented sputum specimens showed the sputum converted from positive to negative in 77 per cent of the cases. On the last third of the series, guinea pig inoculation and gastric contents were used in searching for tubercle bacilli. Ten per cent of the gastric-content smears from sputum-negative cases were positive and 45 per cent of the negative gastric contents were positive by animal inoculation. Mortality for all apicolysis cases was 13.7 per cent. The mortality per operation was 5.7 per cent. Important complications encountered were shock, increase of tuberculous disease, wound infections and massive atelectasis. Ideal indications for apicolysis should include: a relatively good condition and clinical inactivity of the patient, stable or controlled contralateral lesion, absence of severe extrapulmonary complications, thin-walled cavitative lesion of considerable size, single or multiple cavities in the upper paravertebral region, bilateral apical disease that requires bilateral partial collapse, and a functional need for selective partial collapse therapy.—*Indications, Hazards, and Results of Apicolysis Thoracoplasty, J. W. Gale & W. H. Oatway, J. Thoracic Surg., October, 1938, viii, 78.*—(*L. F. B.*)

Myoplastic Thoracoplasty.—Through an anterolateral approach, the sternal portion of the pectoralis major is divided at its attachment to the humerus, and the pectoralis minor is freed and divided at its insertion into the coracoid process, the nerve and blood supply being carefully preserved. The second and third ribs are resected from costal cartilage to the scapular line. The first rib is not disturbed. After the apex is freed, resection of the ribs is completed to the vertebral bodies. After apical dissection is completed, the two ends of the pectoral muscles are transplanted across the lowered apex into the second or third interspace as desired. Doubled chromic catgut matress-sutures are used. The important features of the operation are the anterolateral approach, complete resection of the ribs, extrafascial dissection of the apex, anchorage of the apex, prevention of paradoxical motion, and obliteration of the dead space. Ten patients subjected to this operation had moderately or far advanced disease and other collapse measures had failed. Beneficial results are minimized rather than exaggerated. Of the 10 cases, 3 were apparently successful, 1 questionable, 4 unsuccessful, and 2 died. No case was considered apparently successful unless there was X-ray evidence of cavity closure, sputum negative on concentration for three months, wound healed, and patient discharged from surgical care.—*Myoplastic Thoracoplasty, E. F. Butler, A. M. Skinner, R. Douglass & C. G. Merkel, J. Thoracic Surg., October, 1938, viii, 93.*—(*L. F. B.*)

Extrapleural Thoracoplasty.—A modification of the muscle splitting operation is described, in which the full length of the upper six ribs and long segments of the lower ones are removed through multiple small muscle splitting incisions. Much of the stripping of the ribs is done subcutaneously with specially devised periosteotomes. An extrafascial apicolysis is performed at the time of the removal of the posterior segments of the upper three ribs. The operation is considered useful in patients of advanced years or those with advanced cachexia who are poor surgical risks. Advantages of the operation are minimal postoperative reaction, collapse is produced gradually, muscles of the shoulder girdle are not transected, and incidence of wound infection is less. The exposure obtained does not permit freeing the chest wall from the attachments of the serratus magnus and scalenes, and for this reason the collapse obtained is occasionally less complete than when these procedures can be carried out.—*Extrapleural Thoracoplasty, J. R. Head, J. Thoracic Surg., October, 1938, viii, 55.*—(*L. F. B.*)

Spinal Anaesthesia for Thoracoplasty.—During the past four years various combinations of anaesthesia have been used in the performance of thoracoplasty. Between July, 1936 and March, 1937, 17 operations have been performed under spinal anaesthesia on 9 patients. There has been no mortality, no period of anxiety in regard to the patient and no transfusions have been deemed necessary. The technique described by Etherington-Wilson has been employed. Morphine and scopolamine in larger doses than usual were used as a preliminary sedative. Ephedrine has not been used as a routine. A 1:1,500 solution of nupercaine is injected slowly, the patient being in an upright position. The zones of analgesia depend upon the quantity of solution used and the time the patient is allowed to sit

upright. Ten cc. of solution reaches to the first lumbar nerve segments in from 20 to 25 seconds; 12 cc. in 30 to 35 seconds reaches the tenth thoracic segments; 15 cc. of solution in 40 to 45 seconds reaches the fifth thoracic segments; 15 to 17 cc. of 1:1,500 solution in 55 to 60 seconds reaches the lower cervical segments and is suitable for operations up to and including the first rib. Advantages of spinal anaesthesia are that the patient does not lose consciousness, he can be induced to cough upon instruction, respiratory effort is as quiet as may be expected by any form of anaesthesia, there is less bleeding probably because of the drop in blood pressure and quiet breathing, there is complete muscle relaxation, coöperation of the patient can be obtained immediately following operation, there is very little shock, ephedrine has been administered in about half the cases during operation, the period of induction is short, and the patients have been able to take nourishment within two or three hours after operation. Objections appear to be largely theoretical; a few patients have grunted when traction on the rib was made, possible risk in involving the roots of the phrenic nerve in the anaesthesia and the possibility of severe circulatory disturbance.—*Our Experience in the Employment of Spinal Anaesthesia for Thoracoplasty, F. B. Gurd, A. M. Vineberg & W. Bourne, J. Thoracic Surg., June, 1938, vii, 506.*—(*L. F. B.*)

Thoracoplasty through Short Incisions.—The operative technique is described in a previous communication (Surgery, 1937, *2*, 852). The rib is first divided anteriorly and freed along its lower border, then, at a second posterior operation, the rib is again divided, separated from its periosteal bed on its superior border, and removed. Sharp periosteal raspatories and an intercostal retractor were devised to facilitate this procedure. With the sharp periosteal raspatories the rib can be easily freed from either direction regardless of the direction of insertion of the intercostal muscles. If the rib has been divided anteriorly, it can be removed entirely through a posterior incision. If it is to be removed through an anterior incision it is necessary at the primary posterior division of the rib to remove the short paravertebral angular segment of the rib. This method of rib removal simplifies thoracoplasty and increases the latitude of choice of procedure for the surgeon. It is not difficult to perform an extrafascial apicolysis at the time of the anterior chondrocostectomy. The anterior portion of the lung is freed more readily and effectually through an anterior incision. Following apicolysis, the apex is anchored in a depressed position by weaving a broad piece of catgut back and forth over the dome of the lung.—*Thoracoplasty for Tuberculosis and Chronic Empyema through Short Incisions, O. H. Wangensteen, J. Thoracic Surg., October, 1938, viii, 60.*—(*L. F. B.*)

Thoracoplasty and Sterilized Operating Room Air.—During the past fifteen months 132 individual stages of extrapleural thoracoplasty on 59 patients have been performed in a field of air sterilized by bactericidal radiant energy. These are compared with 110 stages of thoracoplasty done between 1930 and 1936 without sterilization of the air. Mortality has been more than cut in half by the elimination of cases of severe wound infection. There have been 5 wound infections as compared with 36 in the control group. Drains have not been used since the first 3 operations. One of the 5 infections occurred in a primary incision and 4 followed reopening of the wound for a second or third stage. A number of incisions, that would be reopened, have been closed with subcuticular suture of wire. Healing has been good and there have been no infections to date on reopening the wound. There has been a decrease in the average postoperative temperature elevation. More than two-thirds of the cases did not have more than two recorded elevations above 38°C. as compared to one-third of the patients without radiation. Duration of elevated postoperative temperature has been shortened. Wound healing has been more rapid and with less reaction when reopened for the second and third stages. Wounds have been reopened at an earlier date. The general reaction of the patients postoperatively has been greatly improved. In practically all cases, postoperative pain has been less and convalescence has been more rapid. It has been possible to shorten the interval between stages to from thirteen to sixteen days. For the later stages, the primary incision is opened and extended rather than making a new incision.—*Sterilization of the Air in the Operating Room with Bactericidal Radiation, D. Hart, J. Thoracic Surg., June, 1938, vii, 525.*—(*L. F. B.*)

Extrapleural Pneumothorax.—Seventeen cases are reported, with observation up to eleven months at the time of writing. Local anaesthesia was used in every case. The decollation, over the mediastinal aspect, was always carried to the hilum; laterally, it was carried at least to the seventh rib depending upon the extent of the lesion. There were 16 females and 1 male, from seventeen to fifty-one years of age. In all, there was a cavitary lesion in an upper lobe, with persistently positive sputum. Pneumothorax had either been impossible or had proved

ineffective. The cases grouped themselves as follows: unilateral cavities, 4 cases; bilateral disease with unilateral cavities, 5 cases; bilateral cavitary disease with an extensive system of cavities on one side, 4 cases; unilateral cavities with intrapleural pneumothorax, either totally or partially ineffective, 4 cases. In the last group an attempt was made to maintain both the extrapleural pneumothorax and the intrapleural pneumothorax, when the latter was effective in collapsing the lower lobe. There were no operative or immediate postoperative deaths. There were six cures, clinical bacteriological and anatomical. In 3 cases there was clinical improvement with conversion of the sputum, but with persistence of a small portion of the lesion by roentgen examination. In 2 patients there was only slight improvement. Oil was used in one case to maintain the space, but the occurrence of perforation made it necessary to abandon the pneumothorax. There were 5 deaths, coming on from forty days to five months after operation; in 4, death was attributable to tuberculosis. Tomography was of great value, before and after operation, in determining the exact location of cavities, and particularly in demonstrating the persistence of a cavity remnant postoperatively. The absence of postoperative shock in all cases was noteworthy. In the successful cases there was a rapid atelectatic retraction which occurred within a few days and which appeared to be one of the main factors in the closure of cavities. Insufflations should be started on the day of operation, or at the latest on the following day. In order to avoid cervicomediastinal emphysema, positive pressures should not be used in the first few days. Later, pressures up to 30 cm. of water are employed. In the first few weeks, refills should be given frequently. Following a refill, one patient developed a paresis of the left side of the face, with generalized clonic convulsions, comparable to the reactions sometimes seen following so-called pleural shock. In 15 cases, shortly after operation, a serosanguinous effusion appeared. In most cases this resorbed spontaneously in from two weeks to one month. In 6 cases this effusion either underwent a purulent transformation, or a purulent effusion appeared in a previously dry extrapleural space five weeks to four months after operation. These purulent fluids are always of bacillary origin, usually tuberculous; they resorb with difficulty and sometimes reappear after some months in spite of irrigations. These bacillary effusions are an indication of the persistence of an active underlying pulmonary lesion. In the cases which suffered this complication, there was either a poor result or a fatal termination following dissemination of tuberculosis. Contraindications to extrapleural pneumothorax are: subcortical cavities not surrounded by a zone of parenchyma sufficient to permit harmless extrapleural cleavage or adequate postoperative atelectasis; cavities larger than a tangerine; old fibrocaseous lesions with costal retraction and rigid pleura; lesions situated below the sixth rib posteriorly; bilateral, unstable lesions; cavities with rigid walls; severe constitutional symptoms. In general extrapleural pneumothorax should only be considered when intrapleural pneumothorax is impossible or when the latter cannot be improved by pneumonolysis. At present there are not sufficient data to warrant any dogmatic statements. Extrapleural pneumothorax deserves consideration as a palliative as well as a curative procedure.—*Considérations sur le pneumothorax extrapleural, C. Gernez-Rieux, Bull. et mém. Soc. méd. de Passy, no. 10, July, 1938.*—(*H. R. N.*)

Indications for Extrapleural Pneumothorax.—Emphasizing that intrapleural pneumothorax is the method of choice in the treatment of the early cavity, and that thoracoplasty is indicated only for the fibrous cavity, the author points out that a very large number of patients have disease not amenable to either treatment. Extrapleural (or subfascial) pneumonolysis followed by pneumothorax appears to be a valuable addition to our armamentarium. It may be used by itself, or as a supplement to an ineffective intrapleural pneumothorax. The presence of pneumothorax on the opposite side offers no contraindication to the operation. This procedure may be applied also to patients with fibrous cavities whose general condition forbids thoracoplasty. In these cases, to ensure permanent collapse, a thoracoplasty should ultimately be performed. Extrapleural pneumothorax may be elected for patients with early cavities, in preference to intrapleural pneumothorax, when contralateral disease makes it desirable that a localized collapse be obtained. Bilateral apical extrapleural pneumonolysis and pneumothorax has been a valuable procedure. The author points out that the physician need have less fear of advising a period of observation or bed-rest, knowing that even if extensive adhesions develop pneumothorax is still feasible. The length of time for which extrapleural pneumothorax should be continued is not yet known. If the space begins to obliterate within two or three years it is advisable to convert the space into an oleothorax. The results in 155 cases are reported. In 124 patients a satisfactory collapse was obtained. More than a third required

institution of oleothorax. Of 14 deaths, 2 were operative, 9 due to secondary progression, and 3 followed thoracoplasty performed because of unsatisfactory collapse.—*Le pneumothorax extrapleural, M. Schmidt, Rev. de la tuberc., December, 1937, iii, 1122.*—(*H. L. I.*)

Extrapleural Pneumothorax.—After a brief historical review the author attempts to formulate indications for the operation. Extrapleural pneumothorax appears logical in cases where intrapleural pneumothorax is indicated but not obtainable and the patient is not suitable for thoracoplasty; cases with basal pneumothorax but with contraselective collapse; in cases in which thoracoplasty is indicated, but doubt is held whether the patient is able to withstand the operation; in cases with bilateral disease and in poor general condition. Contraindications are as yet as little understood as are the indications. An incision is made centering over the angle of the fourth rib and from two to three inches of the rib resected. The extrapleural plane is identified and developed with the finger, apicolysis being extended under direct vision, using an illuminated retractor. The pleura is stripped with a metal spatula, a gauze sponge on a holder, a pair of long curved scissors or a pair of Hartman forceps carrying cotton pledgets. An air-tight closing is made. The double layer of pleura forming the floor of the space tends to contract during the first few weeks and straighten out between its mediastinal and parietal attachments so that the final extent of the pneumothorax will depend upon these attachments. Refills of air were given on the day of operation and the day after. A positive pressure of from 10 to 20 cm. of water was maintained. The pleura was punctured on two occasions but produced no deleterious effects. The effect of opening the pleura will depend upon the vital capacity of the patient and his ability to withstand total collapse of the lung until air can be withdrawn. Haemorrhage from small vessels was encountered. In cases in which the presence of dense adhesions increased the risk of damage to the lung or perforation of the cavity it was thought advisable to abandon the operation. Minimal operative shock and very little postoperative reaction occurred. A serosanguinous fluid developed in all cases, in the majority small in amount, and was absorbed during the first few weeks. In 4 cases there was delayed haemorrhage into the space. There was no instance of atelectasis of the lower lobe. The cases are too recent to attempt consideration of possible late complications. Results of two series, totaling 40 cases: of 12 early cases, cavity was closed and clinical condition improved in all; of 28 advanced cases, unsuitable for thoracoplasty, there were 2 deaths, 3 operations abandoned, 17 clinically improved, and 13 had cavity closed. It is determined to not be misled into unwarranted optimism by satisfactory early results. There is, however, sufficient evidence to justify further clinical trial of the procedure.—*Extrapleural Pneumothorax, R. Belsey, J. Thoracic Surg., August, 1938, vii, 575.*—(*L. F. B.*)

Extrapleural Pneumothorax.—Extrapleural pneumothorax is directly comparable to the collapse produced by extrapleural pneumonolysis with plombage except that air is used to maintain the space created instead of filling it with wax or living tissue. Air has the advantage in that the degree of collapse can be controlled to a certain degree, a more extensive collapse can be obtained, air has less tendency to produce local reaction, and wax at some time may perforate the lung. This procedure is not a form of collapse therapy introduced to replace modern selective thoracoplasty but is an alternative measure when thoracoplasty is contraindicated. The series of 31 operations, three bilateral, is too recent to justify conclusions. An account of the operative technique is given. An oxygen tent has rarely been needed following operation, even in bad-risk patients. Intravenous infusion has not often been indicated. It is considered important to place the patient in a sitting position as soon as possible to prevent a blood clot from adhering to and stretching between the freed apex of the lung and the parietes. There is not much pain following operation. All patients developed more or less interstitial emphysema. In no case was there retention of sputum for more than thirty-six hours and patients have been able to expectorate better and sooner than following thoracoplasty. There has been no atelectasis of the homolateral lower lobe. The average case required refills on the second, fourth, sixth, ninth and twelfth days and thereafter at longer intervals. Pressures oscillating through a mean of zero have been maintained. A varying amount of sero-haemorrhagic exudate develops immediately after the operation, but is not considered a complication and has not interferred with collapse. In 4 cases the space filled with blood clots, 3 of which could not be aspirated through a needle. The fourth was aspirated through a rubber catheter. Four cases developed infection of the extrapleural space, 3, and probably all, of which gave evidence of having bronchial fistula. The development of fistula in some instances is likely due to necrosis of the lateral wall of the cavity as a result of loss of its blood supply from vascularized chest wall adhesions. The lung reëxpands a small amount during the first six weeks and then

becomes stabilized. It is recommended that pleural separation be carried to a level two segments below the lowest limit of the diseased area. Ballooning of the cavity occurred in one case, such that it was perforated when refills were attempted. The bronchus leading to this lobe of the lung was grossly stenosed. More of the complications were encountered among the first cases selected for this form of treatment.—*Extrapleural Pneumothorax in the Treatment of Pulmonary Tuberculosis, R. H. Overholt & O. S. Tubbs, J. Thoracic Surg., August, 1938, vii, 591.*—(*L. F. B.*)

Bilateral Extrapleural Pneumothorax.—Reviewing the results of 12 bilateral extrapleural pneumo- and oleothoraces the author concludes that the bilateral procedure is indicated in cases of apical lesions with small or medium-sized cavities whenever conservative treatment has failed and when an intrapleural pneumothorax cannot be done successfully. In cases of marked failure of the respiratory function, the bilateral extrapleural pneumothorax should be performed without losing time with attempting an intrapleural pneumothorax. Studies of the respiratory function have shown that it is possible to produce a satisfactory collapse of the apices and of the upper pulmonary regions without further impairing the respiratory function. A respiratory insufficiency, however, was observed in those cases where, following extrapleural pneumonolysis, the extrapleural cavity increased in size due either to haemorrhages or to fluid accumulation. This occurs more likely following the second stage of the bilateral operation and it may be controlled by tapping or by suction. While most of the extrapleural pneumothoraces could be maintained by insufflation of gas, oil or paraffin had to be substituted in several cases where there was a tendency toward excessive shrinking and in others where the patient after having left the hospital could not get the benefit of adequate refillings. In the author's cases there were 14 pneumothoraces and 8 oleothoraces. In two cases a thoracoplasty was necessary. The results until the present time, although encouraging, are, however, far from being definitive. The collapse was satisfactory in all but two cases and the sputum became negative shortly after the induction of the extrapleural pneumothorax.—*Über doppelseitigen extrapleuralen Pneumothorax, G. Sauer, Ztschr. f. Tuberk., July, 1938, lxxx, 217.*—(*F. G. K.*)

Extrapleural Pneumothorax.—Bilateral extrapleural pneumothorax was induced in 12 patients with small to medium sized apical cavities, either because intrapleural pneumothorax, when technically possible, had failed to produce the desired results or because a satisfactory bilateral collapse, whether through intrapleural pneumothorax or thoracoplasty, would have reduced too greatly the vital capacity. In all cases a prolonged period of conservative therapy had proved ineffective. The operative technique employed was that described by Schmidt, Graf, Michelsson and others, with few immediate postoperative complications. A pleural tear during one of the pneumonolyses resulted in a communication between the extrapleural and the residual intrapleural pneumothoraces and a more extensive collapse than had been anticipated. In another case, following the second pneumonolysis, haemorrhage and exudation into the extrapleural space produced severe dyspnoea. By means of frequent aspirations, however, the dyspnoea was relieved. Secondary plastic operations were necessary in two instances. In one the pneumonolysis had been technically difficult due to the inability to separate adequately the endothoracic fascia from the parietal pleura, with the result that an incomplete extrapleural pneumothorax was obtained. In the second case, after discharge from the hospital, a needle was broken and lost in the pleural space during a refill. A tuberculous empyema with a bronchopleural fistula developed. Repeated aspirations and irrigations proved ineffectual, and finally a plastic operation was done to obliterate the refractory empyema cavity. Oleothorax was resorted to in 8 of the 22 extrapleural pneumothorax cavities when their obliteration was imminent during the period of hospital surveillance, or to prevent subsequent obliteration after discharge from the hospital in those cases where facilities would not permit maintenance of the pneumothorax refills with air. With the exception of the two cases which had required secondary plastic operations, all the patients became negative a short time after the second pneumonolysis, with a disappearance of the cavities on X-ray and an improvement in their general condition. In only one patient was the vital capacity reduced after operation. Although too short a time has elapsed, the period of observation being from six months to a year, the author believes that the results enumerated are encouraging and warrant a consideration of bilateral extrapleural pneumothorax therapy for the type of case described.—*Über doppelseitigen extrapleuralen Pneumothorax, G. Sauer, Ztschr. f. Tuberk., July, 1938, lxxx, 217.*—(*A. B. C.*)

Pneumonolysis and Extrapleural Pneumothorax Combined with Oleothorax.—The method here described has recently been revived in Germany and is arousing consider-

able interest on the European Continent. Since the recognition of the value of artificial pneumothorax attempts have been made to collapse the lung by other means in cases where intrapleural adhesions interfere with its success. At Graf's Clinic, near Dresden, Germany, the combination of pneumonolysis with extrapleural pneumothorax and oleothorax has been in use for three years and at Heidelberg the largest group of cases has been treated by Schmidt. In 1934 Graf began to develop the method at present used. In the past, most of the pneumonolyses performed were probably extrafascial. Graf's method was to free the lung from the chest wall in the layer between the parietal pleura and endothoracic fascia and to fill this space with air. In the last three years he has operated on over 100 patients and Schmidt, impressed by his work, operated on a more extensive series in the last two years, modifying certain details. Both Graf and Schmidt, however, stress the importance of freeing the lung in the subfascial layer, including the mediastinal surface as far as the root. The walls of the space thus formed are sufficiently firm and elastic to permit an artificial pneumothorax without positive pressures. Should the space contract too soon, there still remains the possibility of maintaining collapse with oil. Soon after operation a fluid level consisting of blood and serum can be seen, which occasionally needs aspiration. Refills are carried out as with intrapleural pneumothorax but with a longer needle. Puncture should be done through the space left after the rib resection, this area being anaesthetic. The manometric oscillations are less than with intrapleural pneumothorax and smaller amounts of air are required, seldom over 200 cc. In those patients with marked tendency to contraction of the space both Schmidt and Graf use oil, for example, jodipin 20 per cent, but oil containing bromine is being experimented with, the technique being that of oleothorax. Bleeding if it occurs is usually controllable by electrocoagulation. Subcutaneous emphysema is about like that met with after thoracoscopy but mediastinal emphysema has not been met with by Graf or Schmidt. Infection is a possibility but less likely with primary closure. Perforation of the oil internally or externally is rare. So is spontaneous pneumothorax. Indications are the same as for intrapleural pneumothorax, that is, relatively fresh infiltration with cavitation and early infiltration tending to spread but not controllable by intrapleural pneumothorax because of adhesions. Intervention should not replace necessary sanatorium treatment. Because normal lung is not collapsed this procedure is of value in bilateral cases or those with poor respiratory reserve. It may be in some cases combined with internal pneumothorax. Cases with large apical cavities and much fibrosis and mediastinal displacement are unsuitable and need permanent surgical collapse. The method may, however, be used as a preliminary to thoracoplasty, which is thereafter rendered easier. In three years over 300 patients have been operated on. In November, 1936 Schmidt reported 3 fatal cases out of 100 operated on, and Graf in 1937 reported 7 deaths among 107 cases, all in the first 40, and none directly due to the operation. The ultimate results cannot yet be evaluated, but the method seems to have real value in many cases where thoracoplasty is too drastic and intrapleural pneumothorax not feasible or effective.—*Pneumolysis Combined with Extrapleural Pneumothorax and Oleothorax, B. Rhodes, Lancet, August 14, 1937, ccxxxiii, 377.*—(*A. P.*)

Bronchial Occlusion in Treatment of Pulmonary Tuberculosis.—The method here described was performed at the St. Mary's Hospital, London, in the case of a female laundry packer of 21, admitted through the Out-Patient Department of the Brompton Hospital in August, 1937. She was slightly febrile and toxic and showed infiltration with excavation near the apex of the right lower lobe. The sputum contained numerous tubercle bacilli. Right artificial pneumothorax was induced and maintained up to the time of transfer to a sanatorium nine weeks later. A week after its induction she was bronchoscoped under morphia, evipan and local anaesthesia, and a catheter introduced into the right lower lobe bronchus under direct vision, bearing a thin-walled watertight balloon. This was inflated with 4 cc. of distilled water from a syringe and the tap closed. Catheter and balloon were left *in situ* with the proximal end of the catheter, together with adapter and tap, strapped to the patient's cheek. At the end of six hours a massive selective collapse of the right lower lobe was demonstrable by X-ray. As the lower lobe shrank the upper expanded. Pneumothorax refills were continued as before. There was no untoward reaction. Clinical improvement was steady and accompanied by corresponding improvement in the blood sedimentation rate. Frequent roentgenographic controls showed selective right lower lobe collapse to be maintained and no further extension of infiltration. It seems probable from recent work, especially in America, that massive pulmonary collapse occurs more frequently than has been supposed in chronic pulmonary tuberculosis. For over a decade the coexistence of bronchial dilatation has been recognized (Erb, Rist, Jacob and Trocme,

Coryllos, Jennings and Davidson, Lander) but its untoward appearance in artificial pneumothorax seems unlikely on various grounds. Whether a selectively collapsed lobe will reëxpand on abandoning pneumothorax will probably depend on the extent of fibroid change within it, which in turn will be related to the severity of the pulmonary lesion. Those lobes which do not spontaneously reëxpand are best left permanently collapsed. The method of artificial collapse by bronchial occlusion here described has been since applied to other cases and the original instrument modified. It is expected that a series of cases will be later reported.—*An Ancillary Method in the Treatment of Pulmonary Tuberculosis, W. D. W. Brooks, Brit. J. Tuberc., January, 1938, xxxii 14.*—(*A. P.*)

Extrapleural Lobectomy.—By this method the diseased lobe is isolated, if technically possible, extrapleurally; that is, the lung is mobilized with both the parietal and visceral pleura adhering to it. It is carried out in several stages following a preliminary phrenicotomy. A hook-shaped incision is made paravertebrally at the level of the sixth rib and extending to the level of the tenth rib in the mid-axillary line. Segments, 11 to 12 cm. long, are removed from the seventh, eighth and ninth ribs, beginning at the transverse process. If the pleural space is closed, mobilization of the lobe can be done at once. If the pleural space is free, the costal pleura is exposed as extensively as possible and a sterile petrolatum gauze pack applied. The wound is closed except for the lowermost few centimetres. The second stage, at which the lobe is mobilized in several steps, is done after a rest period of three to four weeks. The diaphragmatic portion is removed first and the interlobar fissure identified. Isolation of the lobe is continued in the costovertebral angle and the pulmonary ligament cut. The dissected parts are carefully packed to prevent the formation of new adhesions. In the third stage, after an interval of from eight to twelve days, the interlobar fissure is attacked. A thin rubber catheter is tightened about the hilum and sutured. In the fourth stage, three to four days later, the necrosed lobe is removed by cautery. The wound is treated wide open and its healing occurs by secondary granulation. If the pleural cavity is open greater care must be taken not to enter it. Sixteen patients have been operated upon in this manner with four fatalities. The cases invariably heal with a bronchial fistula which is closed later. During the interval before the closure, mucopurulent secretions escape through the fistula and become mixed with the wound secretions. There is extensive scarring and it has not been possible to later remove another lobe. In cauterizing near the hilum air embolus and secondary bleeding occasionally occur. Of the 16 cases reported, 1 is unimproved, 5 are improved, 6 completely recovered, and 4 died. Of the 4 deaths, 2 were due to pneumothorax complication, 1 to thrombosis of the pulmonary artery, and 1 due to suppurative pericarditis. The author believes that in the surgical treatment of bronchiectasis, the extrapleural method of lobectomy should be among the procedures to be considered.—*Extrapleural Lobectomy, J. Sebestyen, J. Thoracic Surg., June, 1938, vii, 552.*—(*L. F. B.*)

Antibodies in Milk from Tuberculous Cattle.—The presence of antibody in the milk obtained from each quadrant or from the entire udder was determined by means of the complement fixation reaction. The sample of milk was treated for twelve hours with labferment, the coagulated milk was then filtered through hardened filter paper and the presence of complement fixing antibody was determined in the whey, which had been inactivated at 56°C. and preserved with potassium bichromate. As antigen the dried acetone extract of tubercle bacilli prepared according to Beller was employed. After adding complement the mixture was incubated for fifteen minutes, after which time a haemolytic system was added and readings were made after fifteen minutes' incubation. To control the serological findings, the samples of milk which gave a negative complement fixation reaction were injected into animals. The cytology as well as the bacteriology of the various samples of milk was studied. In all clinically doubtful cases of tuberculosis the bronchial secretions were studied microscopically for the presence of tubercle bacilli. As a result of their study of approximately 20,000 samples over a period of four years, the authors conclude that the complement fixation reaction with milk is a suitable diagnostic test which may assist in diagnosing tuberculosis of the udder. Of 14,011 negative reactions, all but 12 were subsequently found to be negative for tuberculosis. On the other hand the positive cases were in a large number of instances found to be nonspecific reactions obtained with milk which contained streptococci or due to milk retained in the udder. However, specific positive reactions were obtained in those instances where there existed manifest lesions. Anticomplementary reactions were observed in 0.5 per cent of samples taken from the entire udder and in 1 per cent of samples collected from each quarter. Of the clinically negative cases specific antibodies

were demonstrated in 4 per cent of the whole milk sample, while among the clinically doubtful cases 11 per cent contained complement fixing antibodies. When milk was tested from each quarter 12 per cent of the clinically doubtful cases fixed complement.—*Serologische Milchuntersuchungen im Rahmen des Tuberkulosebekämpfungsverfahrens aus den Jahrens 1933–1936, H. Ritter & G. Nothdorff, Zentralbl. f. Bakt., March, 1938, cxli, 171.*—(*J. D. A.*)

Generalized Tuberculosis of Swine.—It is commonly believed that tuberculosis of swine, caused by the avian tubercle bacillus, is essentially a nonprogressive localized disease of the lymph nodes of the mesentery and of the anterior portion of the cervical region. Although instances of widely disseminated disease are occasionally reported such involvement has usually been attributed to the bovine tubercle bacilli. In the area from which material for the present study was obtained, approximately 18 per cent of swine slaughtered were tuberculous. Tissues from 30 swine that had extensive tuberculosis were examined, by culture, guinea pig and rabbit inoculation, to determine the bacillary type of infective organism. Avian tubercle bacilli were found to be the sole aetiological agent in 24 of 26 cases, 92.3 per cent. In 2 cases, bovine tubercle bacilli were obtained, and in 4 cases the results were negative for tubercle bacilli. The study suggests that, although avian tuberculosis in swine is predominantly localized disease, it may become generalized and that, in districts where the incidence of localized avian type tuberculosis in swine is high, a considerable proportion of the cases of generalized disease is probably due to the same organisms.—*Generalized Tuberculosis of Swine Due to Avian Tubercle Bacilli, W. H. Feldman, J. Am. Vet. M. A., May, 1938, xcii, 681.*—(*L. F. B.*)

Upper Lobe Pneumonia.—The study covered the period from August, 1934 to April, 1936; during this time 180 cases of pneumonia were seen. Of this number 24 (13.3 per cent) had primary upper lobe involvement. The patients were from twenty to ninety years of age but 70 per cent were in the third, fourth and fifth decades. In 22 patients the onset was acute or catarrhal; in the remaining 2 there was a meningitic onset. In 14 patients there was single upper lobe involvement demonstrated by roentgenograms and in the remaining 10 there was either contralateral upper lobe involvement or associated lower lobe pneumonia. The right upper lobe was involved in 19 cases. The 14 cases with single lobar involvement had a mortality rate of 21 per cent but those with multiple lobar involvement experienced a mortality of 70 per cent. Although careful search was made, in no instance were tubercle bacilli found. In 20 cases the sputum was typed for pneumococci by the Neufeld method and in 13 of these the results were negative; type I pneumococcus was found three times, type II twice, and types III and XIV once each. In general the disease was more severe than in lower lobe pneumonia. Postpneumonic fibrosis and thickening of the interlobar fissure were frequently found after resolution of the pneumonia. Such infiltration is entirely similar to that seen after resolution of exudative tuberculous lesions.—*Upper Lobe Pneumonia in the Adult, B. Rosenblatt & D. Bachman, Ann. Int. Med., April, 1938, xi, 1845.*—(*A. A. E.*)

Bronchitis.—Inflammatory diseases of the bronchi may be classified anatomically according to location and clinically according to duration. Acute bronchitis usually results from extension from the upper respiratory passages. It may be due to bacterial invasion, mechanical or chemical irritation, or passive hyperaemia of the bronchial mucosa. Hyperaemia, oedema and hypersecretion are the earliest pathological changes. Acute bronchiolitis may occur through the extension of an acute inflammation in the larger bronchi or, particularly in children, it may be an independent disease. Pathologically it is similar to acute bronchitis. It is from acute bronchiolitis that bronchiectasis may develop. Obliterative bronchiolitis develops from those forms of acute bronchiolitis in which the exudate cannot be eliminated. The obliterative type is found with diphtheria, measles and influenza. Chronic bronchitis may follow acute bronchitis or it may develop in the course of heart failure, protracted congestion of the lungs, prolonged inhalation of dust and in bronchial asthma. It may be hypertrophic in which the mucosa is thickened, or atrophic in which the mucosa is scarred and thin. If the thin wall yields, bronchiectasis results. Putrid bronchitis is caused by stagnation of secretions. Fibrinous bronchitis is characterized by the formation of casts of fibrin and mucus. Tuberculous bronchitis is usually dependent upon cavernous lesions in the lungs. It may be caused by direct invasion of the mucous membrane or by extension from neighboring tuberculous lymph nodes. It may be ulcerative, nonulcerative or granulomatous.—*The Pathology of Inflammatory Diseases of the Bronchi, O. Auerbach, Quart. Bull. Sea View Hosp., January, 1938, iii, 134.*—(*A. A. E.*)

Key to Abstractors

A. A. E.: Adrian A. Ehler, Los Angeles, California.
A. B. C.: Adele B. Cohn, Bedford Hills, New York.
A. P.: Andrew Peters, Springfield, Massachusetts.
F. B. S.: Florence B. Seibert, Philadelphia, Pennsylvania.
F. G. K.: F. G. Kautz, New York City.
G. F. M.: Gertrude F. Mitchell, Detroit, Michigan.
H. L. I.: Harold L. Israel, Philadelphia, Pennsylvania.
H. R. N.: H. R. Nayer, New York City.
H. W. H.: Harlon W. Harrison, Northville, Michigan.
J. D. A.: Joseph D. Aronson, Philadelphia, Pennsylvania.
J. E. F.: Jason E. Farber, Buffalo, New York.
L. F. B.: Lauren F. Busby, Northville, Michigan.